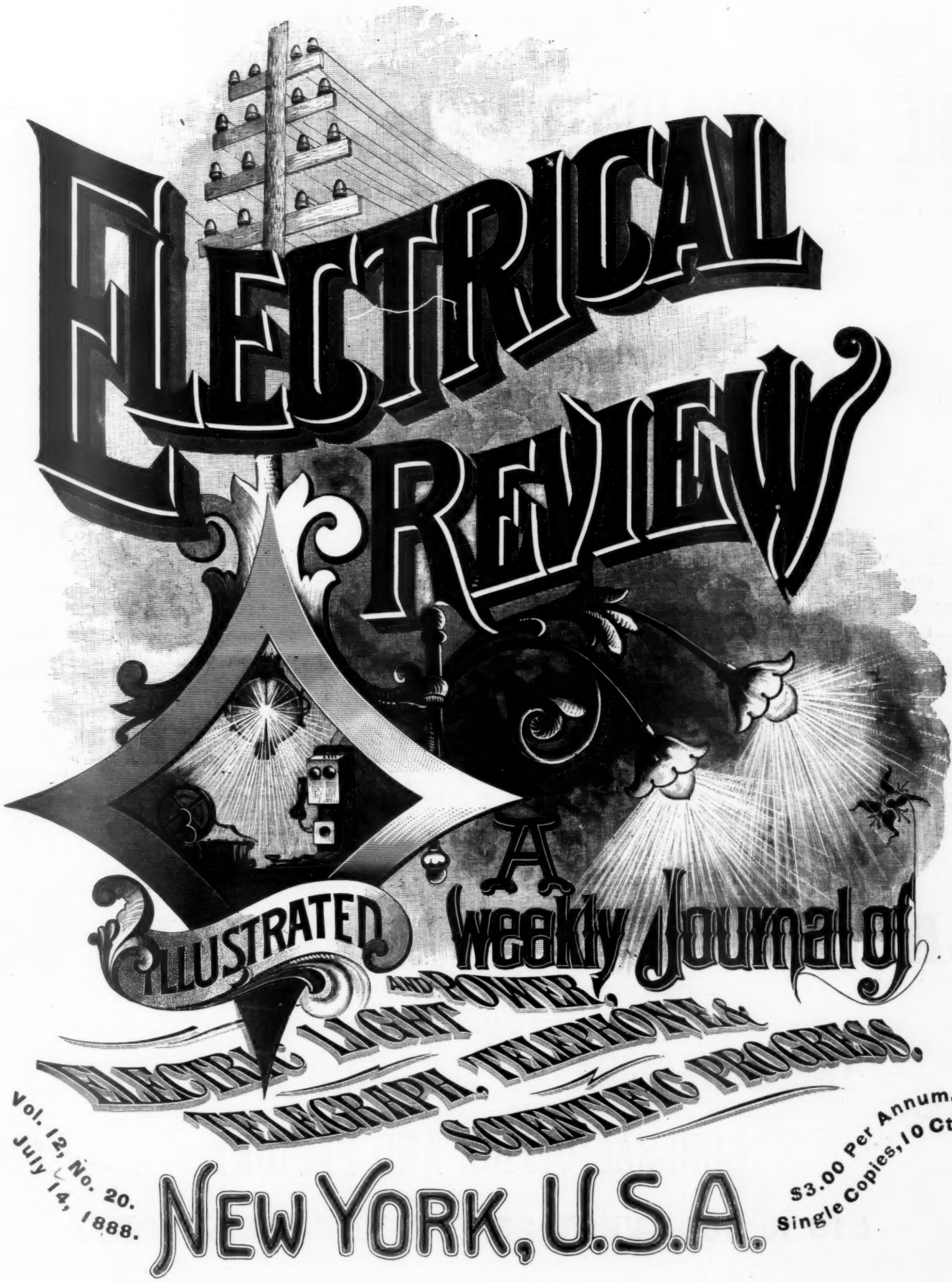
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The Moebius Electrical Process for Refining Silver.

For several years Mr. B. Moebius has been laboring assiduously to perfect his process for the electrical separation of gold and silver, which has now been put into practical operation, with excellent results, says Courtenay DeKalb in the *Engineering and Mining Journal*. The first experiments were tried in Chihuahua, Mexico, several years ago, where a working plant was erected, and the efficiency of the method demonstrated, but want of sufficient capital to make rapid payments on the bullion treated necessitated the abandonment of the enterprise. Patents being obtained Mr. Moebius offered to sell the right to the government for use in the United States assay offices, especially at the one in New York, but some of the officials deemed the risk too great and the sale was not consummated. Since then a small plant has been erected in Kansas City, and another in the works of the Pennsylvania Lead Company, near Pittsburgh, which company has secured the right for the State of Pennsylvania. The results have been eminently satisfactory at the latter place, 20,000 ounces of silver bullion being refined daily, at a smaller cost than by the methods previously employed, and the product is said to be the best ever offered at the United States Mint in Philadelphia, the bars running from 999 to 999.5 fine. Encouraged by this, Mr. H. G. Torrey secured the patent right for New York and New Jersey, and has recently put up a small working plant at No. 153 Cedar street, New York City. The success of the method has received fresh demonstration here, one lot of 1,000 ounces having turned out 1,000 fine. This was attested, not only at the United States Assay Office, in New York, but at the Mint, in Philadelphia, as well. Refining by this method can be done in New York for three-fourths of a cent per ounce, while the minimum charge that will leave a profit to the refiner using other methods is one cent per ounce. As a result of Mr. Torrey's trial, a company is being formed which will enlarge the capacity of the plant to meet the requirements of custom work.

The principle upon which the process depends is, that when silver to be refined is made the anode in a weak nitric acid bath, the silver will pass into solution as nitrate through the action of an electric current from a dynamo, and will be redeposited in the metallic state upon a silver plate which constitutes the cathode. In practice the base bullion is cast in plates ½ inch thick and about 14 inches square. These plates are inserted in muslin bags intended to retain the gold, platinum, lead (as per oxide), and other metals remaining after the silver is dissolved out, and are suspended in the tank of acid from copper rods. Alternating with these are the silver plates for the deposition of the refined silver. The current is 150 amperes, and one volt to each tank. The tanks can be arranged in "series" or in "multiple arc" at will. Mr. Torrey is using an Eddy dynamo of the Mather type. In each tank is a tray for catching the silver as it is scraped from the cathodes by automatic brushes, which move constantly back and forth across the plates, thus preventing the silver from accumulating and forming a connection with the anodes. For convenience in cleaning out the trays, they are arranged so as to admit of being hoisted out of the tanks, and the bottom of each is divided in the middle and hinged to the sides of the frame so that upon removing a silver pin these sections swing down and outwards, dropping the silver into tubs placed underneath. The bath contains no more than one per cent. of nitric acid, and will not, for a very considerable period, produce any noticeable effect upon the muslin bags. Under the influence of the electric current the silver rapidly dissolves, and any copper in the bullion is dissolved also, but remains in solution. The process is peculiarly adapted to refining Doré silver, which contains about 800 silver and 100 of gold.

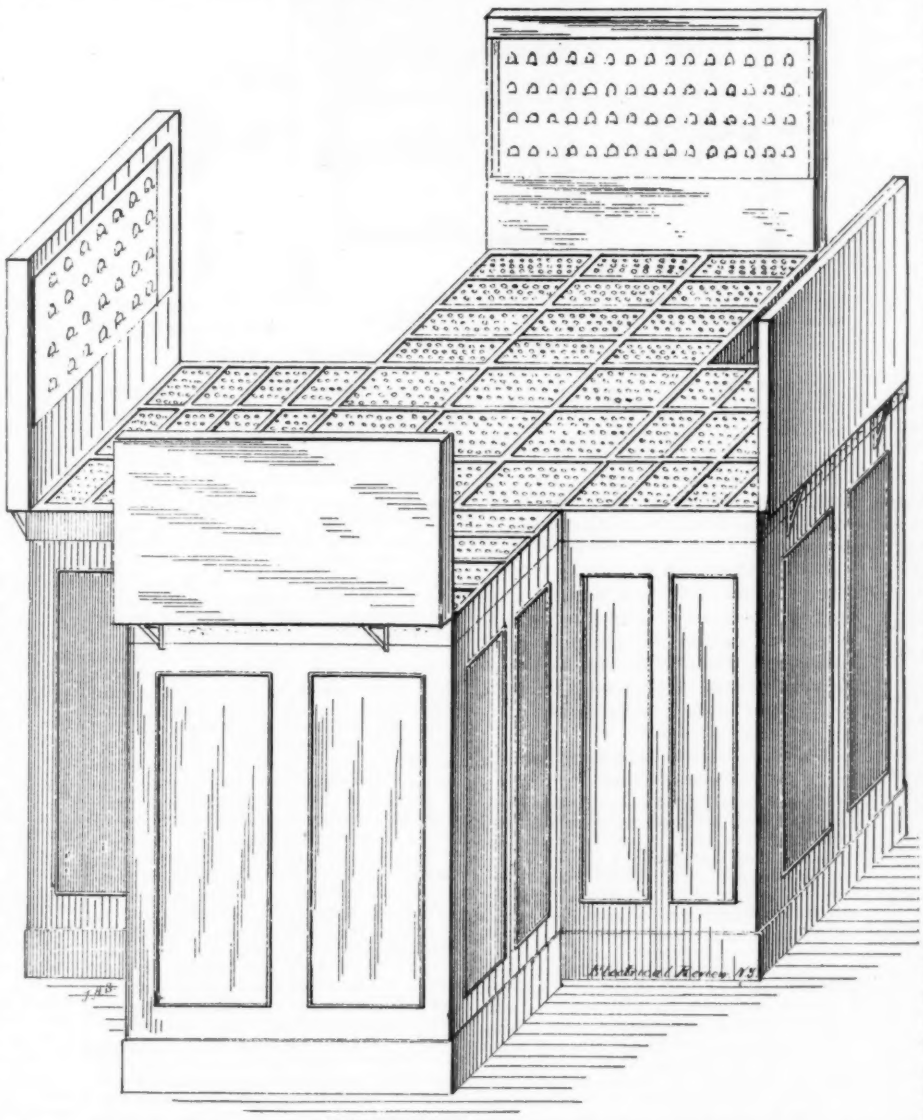

FIG. 1.—VIEW OF THE VAIL & SEELY TELEPHONE SWITCHBOARD. (See pages 6 and 7 for other illustrations.)

The Lightning Rod Frauds.

A dispatch from Beaver, Pa., brings the information that Henry Schmautz, a former Pittsburger, who lives on a farm in Moon township, is out $237. The other day two men stopped at his house and told him they would like to test his lightning rod. He permitted them to do so, and they pronounced it "no good." They said they wanted to advertise their rod in this section and would put one up for him free of charge if he would pay for the post which went into the ground. He agreed and signed what he supposed was an agreement to that effect. Next morning bright and early the men were on hand, tore down the old rod and put up a new one. In a few days he discovered rather unpleasantly that he had signed a note for $237 and that his visitors had discounted it at a bank. The men are thought to be operating in Ohio at present.

The amount of sales of the Sprague Company in stationary motors during the past month have exceeded that of any other month during the existence of the company.

Vail and Seely's Improvements in Telephone Exchanges.

None of the applications of electricity in the useful arts has developed, improved or advanced with greater rapidity than telephony. No sooner does one exchange establish itself in new quarters, with the latest improvements, than active minds advance the standard of excellence to a point which literally makes the goal of to-day but a starting point for to-morrow.

The new exchange of the Metropolitan Co., of New York, is at present at the head, and the improvements contemplated for use in the new Cortlandt street building, are certainly far in advance of the best that the market affords.

The multiple board system is the most efficient system now in use, and its essential characteristics are still retained in the improved system.

The multiple board system, as at present used, consists of a series of duplicate boards, upon each and every one of which the aggregate number of sub-station lines have spring jack connections; at each board there is a group embracing a number of circuits; in any given case this is the number of circuits which it is demonstrated by experience that one operator can successfully attend to; the aggregate number of circuits divided by the number of circuits in a group gives the number of separate boards constituting the multiple board system; thus, if we have 5,000 wires, and there are 100 wires assigned to one group or one operator, there must be 50 boards in the multiple board system occupying an immense floor space.

The inventions of Theo. N. Vail, the active executive officer of the company, and John A. Seely, the electrician, have greatly improved this condition of affairs, and made an unprecedented saving of space and in the expense of erection and maintenance.

The chief characteristic of the improvements consists in making the aggregate number of spring jacks on one board accessible to two or more groups of circuits or operators; the board selected for use has accommodations for 5,000 spring jacks and eight groups of circuits, employing eight operators; this seems simple enough when you are told how it is done, but it is of immense importance; for by resort to this expedient six or seven boards take the place of fifty, and 250,000 spring jacks are replaced by less than 40,000. Fig. 2. of the accompanying cuts shows the plan of board. A indicates the position of the spring jacks, a^1 to a^8 the ringing off annunciators; no calling annunciators being required as will be explained, the groups of circuits terminate in rows of jack plugs, b^1 to b^8; rows of push buttons for ringing in either directions are at c^1 to c^8; and looping in keys at d^1 to d^8; g^1 to g^8, indicates the position of support for operators. The board is in the form of a Greek cross and is horizontally arranged.

Continued on page 7.

Helena, Montana.—The Helena District Telegraph Company has been organized with $30,000 capital.

Detroit, Mich.—The Hicks Induction Light and Motor Company, of Detroit, has been incorporated. Capital stock, $400,000.

Chico, Cal.—The Electric Light and Motor Manufacturing Co., Chico, Cal. Capital, $100,000. James Anthony, and others, incorporators

Camden, N. J.—The Ajax Lead Coating Company filed articles of incorporation. The authorized capital stock is $1,000,000, with $3,000 paid.

Amsterdam, N. Y.—The Amsterdam Electric Street Railroad Co., Amsterdam, N. Y. Capital, $250,000. Albert E. Tabel, and others, incorporators.

Jersey City, N. J.—The Havana Electric Light Co., Jersey City, has been incorporated. Capital, $15,000. Joaquin del Calvo, and others, incorporators.

Chicago, Ill.—The Chicago Insulating and Construction Company; capital stock, $250,000; incorporators, B. Palmer, E. A. Mulhard and I. M. Hunter.

Delevan, Ill.—The Delevan Electric Light Company, of Delevan. Capital stock, $6,000. The incorporators are J. M. Allen, A. L. Maclay and F. E. Allen.

Camden, N. J.—The People's Telephone Company of New Jersey have filed articles for the change and increase of business and the increase of capital to $1,000,000.

Chicago, Ill.—The Gaston Electric Headlight Company, at Sparta; capital stock, $100,000; incorporators, J. E. Gaston, J. R. Denier, D. P. Barker and R. J. Harmer.

Chicago, Ill.—The Thirty-first Street Electric Light and Power Company, Chicago, with $50,000 capital stock. J. Shimers, J. J. McEvoy, S. King, and Owen O'Neil are the incorporators.

Knoxville, Tenn.—The Knoxville Electric Light and Power Company has been chartered. J. M. Thornburg, Geo. Andrews, J. C. Duncan, W. H. Simmons and E. F. Wiley are the incorporators.

Chicago, Ill.—The American Liquid Electograph Manufacturing Co. at Chicago; capital stock, $250,000; for the manufacture of liquid electographs; incorporators, William Vogel, G. A. Ploger, and Joseph Steinhoff.

Nantucket, Mass.—The Nantucket Electric Light Co., with the following officers: President, Henry Riddle, of Nantucket; vice-president and clerk, Francis H. Raymond, of Boston; treasurer, P. A. Underwood, of Boston.

Albany, N. Y.—The capital stock of the Union Telegraph Co. has been increased from $100,000 to $200,000. It is proposed to extend the lines from North Adams to Boston and to other eastern points, also to Plattsburg, N. Y.

Nantucket, Mass.—The Nantucket (Mass.) Electric Light Company has been organized, with the following temporary officers: President, Henry Riddle of Nantucket; vice-president and clerk, Francis H. Raymond of Boston; treasurer, P. A. Underwood of Boston.

Philadelphia, Pa.—The Ajax Lead Coating Company has been organized at Philadelphia, with a capital of $1,000,000, to develop the Clamer and Hendrickson patents for coating metallic surfaces with lead. The company will erect a large plant immediately, and establish branch works and lease rights under the patents.

Chicago, Ill.—The Paige Iron Works of Chicago; capital stock, $25,000; to purchase iron, steel, copper and other metals, to manufacture articles from the same, and to deal in its own capital stock and that of other companies; incorporators, John Crerar, Edward S. Shepard, and Alonzo W. Paige.

Philadelphia, Pa.—The Electric Reporting Company of Philadelphia, which will lease lines of telegraph for the private use of individuals, firms and corporations for the purpose of serving financial and general news and market quotations of stock, oil, grain, etc., by telegraph in Philadelphia, Pittsburgh, Allegheny and Oil City. The capital is $5,000.

Walla Walla, W. T.—Light, Power and Fuel Company. Stock, $150,000. F. D. Boyer, C. B. Hopkins, J. L. Sharpstein, A. I. Jones, N. O. Woods, Wm. A. Egbert and G. W. Babcock. The objects of the corporation is generating electricity for motive and general purposes, erecting and operating electrical works and dealing in electrical goods and appliances.

Lincoln, Neb.—The Clay County Telephone Company of Clay Center. The business to be transacted is the construction and maintenance of a telephone line in Clay county. The capital stock is placed at $2,000. The company is officered as follows: J. B. Dinsmore, president; Ezra Brown, vice-president; John C. Hedge, general manager; C. J. Furer, treasurer; J. F. Eller, secretary.

Portland, Me.—The Brazilian-Thomson-Houston was organized at Portland, capital stock, $500,000; amount paid in, $700; par value of shares, $100. The stockholders are Joseph A. Grant, Everett, Mass.; Henry C. Buck and Fred. S. Parsons, Somerville, Mass.; Harry B. Prindle and George W. Davenport, Boston, Mass.; Robert P. Clapp and Ellery I. Garfield, Lexington, Mass. George W. Davenport is president, Ellery I. Garfield, treasurer. The purposes of the corporation are to carry on the business of buying, selling and leasing in the United States and in foreign countries electric light plants, including power plants for the operation thereof.

A Growl About the Telephone and the Electric Light.

The unfortunate possessors of telephones, for which they are paying full rentals, are wondering how long it will be before the company does something to remedy the nightly nuisance of the electric light dynamos. The value of the telephone service is reduced by the dynamos at least 50 per cent. every night, and in many cases it is almost impossible to communicate. And so it has been right along until the long-suffering public is beginning to think that this is the way it is to be continued. It is far easier to talk from Hartford to Middletown than it is to talk over 100 yards of wire in this city after 4 P. M. If the electric light companies cause the mischief, and infringe upon the telephone company's rights, it would seem to be the business of the telephone company to find a way to protect their customers, who have suffered a good while.—*Hartford Courant.*

—— The dynamos and motors for the Salem, Mass., road were shipped last week. The first portion of the equipment will consist of six cars, but with dynamo capacity for a large increase.

—— The laboratory of Thos. A. Edison was shut down last week, for one week, to give the employés a season of rest during the hot weather. Edison himself was at work every day as usual, however.

A New Departure in Electric Motors.

Dr. Orazio Lugo, of New York, received a patent, July 3d, on a novel motor, which apparently possesses much merit and commends itself for simplicity and cheapness of construction.

It is based upon the fundamental principle laid down by Faraday, that if two solenoids with cores and pole pieces are parallel to each other and are energized, there will be attraction between the pole pieces of the respective solenoids, as well as the windings of the coils which compose the solenoids.

A series of stationary field magnets of simple spool bobbins, with inwardly projecting pole pieces at each end, are arranged around a circle, with multiple arc connection to one pole of the current source, the free ends of the bobbins being connected each by three separate wires to stationary commutator strips 120° apart, so that the whole commutator is made up of 12 strips, arranged in groups of three.

The armature bobbins, three in number, with radiating end pole-pieces, have a common or multiple arc connection, with a revolving brush carried by the armature shaft, said brush contacting with the stationary commutator strips, the bobbins being located inside or concentric with the field bobbins. The free ends of the three armature bobbins are connected each by four wires with a revolving commutator carried by the armature shaft at the opposite end of the machine from the stationary brush, said bobbins being connected in groups of four, there being three such groups, making 12 commutator strips, or the same number found in the stationary commutator before mentioned. A stationary brush bears on this rotating commutator, and is connected to the other pole of the current source. By this system of commutation, each armature bobbin is in circuit once, and once only, with each field bobbin, so that 12 distinct pulls are made for each complete rotation of the armature. The armature and field bobbins therefore all rest magnetically until needed, and the pull is tangentially distributed around the axle, so that there is no possibility of dead centres. This motor seems to possess wonderful adaptabilities for street-car purposes because of the ease with which it starts under full load. We are advised that by reason of its simplicity it can be made at a cost far below any figure even suggested for motors now in the field, and that comparative tests made show its efficiency per dead weight to be greater than any known motor. The advantages claimed for it are: First, facility for starting with dead load, the pull being tangential and successive. Second, no heating or Foucault currents, the effective bobbins being used only when needed, and resting electrically and magnetically when not in use. Third, no sparking at the brushes, because there is no lead nor distortion of the magnetic field, inasmuch as it rotates constantly in advance of the effective armature bobbin. Fourth, a minimum number of lines of magnetic force are created at one time, and used as needed, thus avoiding the great waste in radiating lines of force found in motors of the well-known types in which the field magnets are kept constantly energized, while only a small portion of the field is magnetically used, and that not always to the best advantage. It will be understood that by this method of rotating the field in advance of the rotating armature a maximum effect is had successively as the armature advances. The inventor has certainly displayed great ingenuity in his method of commutation, and deserves great credit for having developed such a simple and efficient motor based upon the fundamental principles enunciated by Faraday. We shall loook with interest for further developments promised in the field which this novel motor opens up.

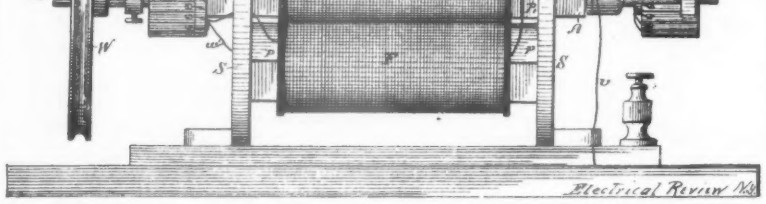

FIG. 1.—VIEW OF THE LUGO MOTOR.

OUR LONDON LETTER.

(Special Correspondence.)

Last week, Lord Thurlow's Electric Lighting Act Amendment bill was safely carried through the House of Lords, to whom it had been returned for the consideration of some slight alterations proposed by the Commons. The passing of the Act is dealt with enthusiastically by some of the daily papers, though the electric lighting companies have taken little or no interest in it. The fact is, that so much has been said about the legislative obstacles to the development of the electrical industry, that the general public imagines the only thing wanted to start a central station in every town is an "amendment." This Act, however, is quite insufficient to supply the demand for legislation on this question; what was really wanted was some comprehensive and entirely new Act, such as that proposed by Lord Crawford.

This will now probably be proceeded with, but meanwhile, much valuable time has been lost, and the public, supposing that all that is necessary has been done, will no longer take an interest in the matter, or urge matters on by the weight of its opinion.

In the Incandescent Lamp case, it has been arranged that the experiments shall be carried out, for the Edison Swan Company by Dr. Hopkinson and Professor Demar, and for the Brush Corporation by Professors Crookes and S. P. Thompson. The "moderator" who will present a general and impartial report to the judge, will be Professor Stokes.

The town of Bradford has at last made up its mind to borrow £25,000, to set up an electric lighting central station for 3,000 incandescent lamps of 16 candle-power, for seventeen years. The gas works have been under the management of the corporation, and although by introducing an electric light scheme they may seem to be cutting their own throats, the town clerk pointed out with more foresight than can usually be expected from such officials, that it was most necessary for the town to monopolize the electric business before any one else had time to step in. This is unquestionably the right view for all gas men to take of their own interests. They should aim at running the electric show themselves, instead of letting it cut them out.

In the House of Commons the other day Mr. Vincent asked Mr. Raikes, the Postmaster General, some very pertinent questions as to the telegroph rate between England and France. He pointed out that between England and Ireland or the Channel Islands the charge was the same as that for an inland telegram, *i. e.* ½d. per word, whereas between England and France 2½d. per word had to be paid, although the submarine cable to be maintained was only about one-third of the length. France had also established a 1d. rate with Algeria. Mr. Raikes replied that although no extra charge was made to Ireland, the cable was worked at a loss, and he therefore could not recommend any reduction of the rate on the other cables.

Relative to the same subject, Mr. Blount, the president of the British Chamber of Commerce in Paris, has addressed a public letter to the postmaster, arguing in favor of a reduction on the ground that the increased number of messages would amply compensate for the lower charges, and thus prove of advantage both to the post office and the public. There is little hope of a 1d. rate at present, but the French administration have made definite proposals for a 2d. rate, which will probably be adopted as soon as the projected telegraph convention between the two countries is held.

For some months past, the Brush Company have been hard at work on the large plant ordered by the Australasian Electric Light Company for the Melbourne Exhibition. The total number of arc lamps to be fixed is about 900, and they will be run by nearly 40, 23 light Brush dynamos. Besides this there will be about 2,000 16 candle power incandescent lamps, run by 7 compound wound Victoria dynamos in parallel. Another big bit of wiring has just been finished at the Langham Hotel. The total number of lights is about 1,400, and the current is supplied from the Grosvenor Galley Central station. The transformers are placed in a separate building at some little distance from the hotel.

G. H. O.

LONDON, June 23.

The Tesla Motor.

To the Editor of Electrical Review:

The Tesla alternating current motor is entirely different from the very old class of devices, to one of which Mr. Kintner refers on page 1 of your issue of June 30, and in all of which devices motion is transmitted by impulses of currents moving in opposite directions in comparatively slow succession. In fact the first telegraph of Gaus and Weber in 1835 was operated by alternate currents acting upon a galvanometer needle, deviating it to the right and left; while Steinheil, in order to make the signals audible, added to this, in 1838, two bells of different pitch which were alternately struck when the needle was deflected right or left, and also in order to make a permanent record, he moved strips of paper by machinery and made dots on it by furnishing the needle with a tube containing ink. (1)

Most of the submarine cables are now worked by means of alternate currents and this for an important additional reason, namely, a long insulated conductor acts like a very elongated Leyden jar and becomes charged at the transmission of every signal, while the following reverse current neutralizes this charge, reducing the time required between the signals, and thus increasing the capacity of the cable. In this case the signs are made visible by attaching to the needle a small mirror which reflects the light of a lamp as a white spot on a scale, and is moving right or left with the alternate movements of the needle impelled by alternate currents. Again, the rapid telegraph system operated by strips of perforated paper, is worked by alternating currents.

The London standard clock, referred to by your correspondent, is only another application of this very same device, being also actuated by currents generated by the action of permanent magnets upon bobbins or coils, as was the case with the telegraph signals of Gaus and Weber in 1835; the only difference being that in the clock the currents alternate continually at equal periods of time.

It is thus seen that the principle upon which Varley's electric clock operates is anticipated by Gaus and Weber's device of 1835, but none of those devices have the least relation to the motor of Mr. Tesla, which is based on the practical application for motive power of the torrent of electric currents produced by an alternating dynamo, which currents succeed one another with the astounding rapidity of some twenty thousand alternations per minute. (2)

It is self-evident that such a current cannot act upon a galvanometer, nor charge electro-magnets, for reason that the opposite currents continually neutralize one another, wherefore they cannot be measured by the ordinary appliances used for continuous currents, nor can such a current give the least movement to any electric motor based upon attraction and repulsion of electro magnets, whatever be its type.

Mr. Tesla's alternating current motor is based on an entirely new principle which must be carefully studied to be understood, and it is only the want of the latter which may cause it to be confounded with the various other devices referred to above, of which the alternations amount to 4 per second at the most, while the Tesla motor works with some 400 alternations per second.

It is evident that the ordinary type of electro-motors is here out of the question, and Mr. Tesla's merit consists in the application of a very differerent principle discovered by him and the construction of a very peculiarly arranged motor invented by him.

While congratulating Mr. Tesla with his success in this new path of pursuit, I cannot leave him without bringing to his notice an oversight he makes in his address on May 16th to the American Society of Electrical Engineers, as published in the Electrical Review of May 20th. He says: "In reality * * * all machines are alternate current machines, the currents appearing as continuous only in the external circuit, during their transit from generator to motor. In view simply of this fact, alternate currents would commend themselves as a more direct application of electric energy, and the employment of continuous currents would only be justified *if we had dynamos which would primarily generate, and motors which would be directly actuated by such currents.*"

The oversight I refer to is that Mr. Tesla only has in view the first machines of Siemens, Halske, Wilde, Ladd, Weston's first electro-plating machine, Moehring, Baur, Brush, and a few others of the same type, in all of which alternate currents are produced, which by the commutator are brought in the same direction. If we had no other machines as such, Mr. Tesla's remark would be correct, but the fact is that *we have dynamos which will primarily generate, and motors which will be directly actuated by such currents.*

This class of dynamos and motors are based on the invention made in 1860 by Pacinotti, of Florence, of a motor of which the acting part consisted of an iron ring placed between two diametrically opposed magnetic poles and which ring revolves around its axis. It was wound with a series of coils, of which the ends were connected together and with a commutator on the axis in such a way that the battery current entered and had exit at two diametrically opposite points, sub-dividing itself over two paths, each of which passed through the coils of half the ring. The result was the formation of two diametrically opposite poles which, when the ring revolved, were continually shifting, and could be adjusted in such a way that there was a continual pull of the permanent magnets, without any reversion of polarity or of current.

It is on record that Pacinotti, by revolving his motor by mechanical means, generated induced currents, which he tested by the constant deviation of the galvanometer needle and of which he said: "A machine of this kind will furnish an uninterrupted current in the same direction without the necessity of any mechanical device, for changing currents running in alternate opposite directions into currents running in the same direction." (3)

Ten years later Jamin reported to the French Academy that Gramme had invented a new magneto electric machine which produced currents in the same direction.(4) This machine was nothing but a Pacinotti ring revolving between the poles of a permanent magnet. It is doubtful if Gramme had any knowledge of Pacinotti's invention, or made his invention independently of such knowledge, but in any case it inaugurated a new era in the production of powerful electric currents, and very soon the great number of possible variations on this principle induced Gramme to construct various machines for galvano-plating, electric lighting, charging storage batteries, etc., and it was not long before real or supposed improvements were made by Fein, Schuckert, Heinrichs, Fitzgerald, Siemens, Halske, Weston, Moehring, Maxim, Niaudet, Wallace—Farmer, Lontin, Buergin, Hefner-Alteneck, Tompson-Houston, and many others.

It was then found that these constant current machines gave more economical results than those constructed on the old principle of reversing currents brought in the same direction by a commutator, consequently they became the leading type for several years, until Lontin pointed out that the use of a commutator for bringing alternate reversing currents in the same direction involved a great loss, also that for the production of electric light, it was unnecessary, so that alternating current machines would be far more economical for this purpose, and he proved it by the introduction of his large alternating machine with 24 pole pieces, able to feed a number of 12 or less entirely independent circuits.

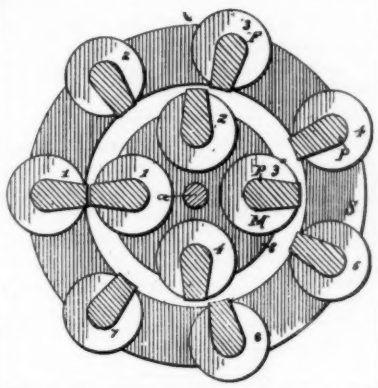

Fig. 3.—Sectional Elevation of a 4-7 Pole Lugo Motor.

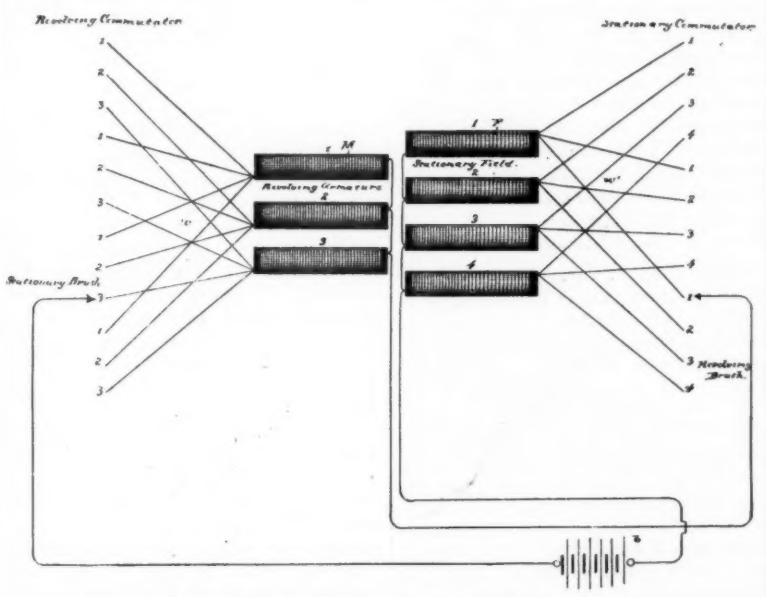

Fig. 2.—Diagram of Commutation of a 3-4 Pole Lugo Motor.

Soon after alternating machines of various types were constructed by Gramme, Siemens, Halske, Hefner-Alteneck and many others, and it was quite natural that attempts were made to extend their sphere of usefulness beyond that of electric illumination; the possibility of their application to electro-motors appeared almost hopeless, until Mr. Tesla came forward with his motor, which no doubt will inaugurate a new era, if not a revolution in electro dynamics.

P. H. Vander Weyde.

New York, July 2.

(1.) See Noad's Electricity, edited by Preece, London, 1879, p. 411.

(2.) If my memory serves me right, the alternating machine with which the welding of iron and steel was performed at the late exhibition of the American Institute Fair made 24 alternations for every revolution, while the latter amounted to 1,500 per minute.

(3.) Comptes rendus, Vol. LXXIII, p. 144 and 175.

(4.) Shellen Magnet and Dynamo Electrischen Machinen. Cologne, 1882, p. 129.

The Los Angeles, Cal., Electric Road has assigned to W. R. Blackburn for the benefit of its creditors. Col. H. C. Howland is president, and E. T. Beatty secretary of the company. The road was built, it is said, as a boom scheme to sell real estate.

SOUTHERN ELECTRICAL NOTES.

(Special Correspondence.)

At half past twelve o'clock on the morning of the 30th ultimo, the building owned by the Electric Street Railway Company, of Montgomery, was discovered to be on fire. Notwithstanding the prompt turning out of the entire fire department of the city, the flames were soon found to be beyond control on account of the presence in the building of considerable paints and oils. The building, with all its contents, consisting of electric cars, machinery, etc., were destroyed. The building was a new brick structure, three stories high, and the plant was considered a very valuable one. The damage is estimated to be within the neighborhood of $35,000, with probably as much as $30,000 insurance. Mr. William Wallace, foreman and engineer, was sleeping on the third story when the fire was discovered, and had to jump for his life. In the fall he broke one of his legs, and received other very serious internal injuries. The broken limb was amputated and the wounded man may recover. The company announce it as their intention to rebuild at once, but it is possible that they will adopt a different system of electric motive power than that which they had in use before the fire.

The Western Union Telegraph Company is soon to open an uptown office at Bessemer, Ala. The only office the company has there is at the Alabama Great Southern Depot, and it is not large enough to accommodate the rapidly increasing business. A new office was opened in the Charleston Block on the 1st of July, in addition to the one now in use. Two operators are employed, and a much better telegraphic service will be afforded the people of Bessemer. The Western Union Company is doing a heavy run of business at that place, and will enlarge its new office from time to time. The town of Bessemer is one of the most remarkable instances of rapid growth on record. One year ago it was without a sign of habitation, yet to-day it is a bustling place of 3,000 people, a perfect little city. The enterprising spirits there are already discussing electric lights and a telephone exchange, and there is no better field in the South for ambitious young electricians to betake themselves and investigate the possibilities for business in the two projects indicated.

The town of Winston, North Carolina, having just equipped itself with a splendid electric lighting system, is also agitating a project looking to the organization of a company to set on foot an electric street railway, and in addition to this enterprise, experiments are now being made with the Writing Telegraph, a line having been stretched between an uptown house and the Salem Iron Works, many blocks distant. A. M. Robinson is the inventor, who has stirred up considerable interest in his invention among the leading business men of the place. They have expressed themselves highly pleased with the results of the experiments, the writing being done accurately, and without any perceptible "hitch." A meeting of the business men of Winston-Salem was held one day last week in the Chamber of Commerce rooms, for the purpose of considering the advisability of getting up an exchange, at which no definite action was taken.

Winston has evidently the electric fever to an exceedingly comical degree. Last week lightning rods were placed on the electric light poles of that city.

Birmingham, having just put into position an admirable electric fire alarm system of the Gamewell pattern, is now preparing to increase the brilliancy of her already well lighted streets by the addition of fifteen new arc lights. Birmingham never goes backward; upward and onward is her motto, as it is the inspiring incentive which stirs nearly every one of the wide-awake Southern towns to place their best foot forward with tireless persistency.

Electric lights have been placed into position within the Shella Rock Cave, near Huntsville, Alabama, and now that famous cavern is a perfect blaze of electricity. Visitors to the cave are charged the modest sum of $1 per head, or $10 per season.

Work on the Hotel Wilmer in this city is progressing rapidly, and manufacturers of annunciators and other electric appliances for hotels are invited to send circulars of their goods to Mr. W. H. Williams, the gentleman who is in charge of the construction of the building. Edward A. Oldham.

Anniston, Ala., July 3.

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Address all communications and make all Express Money orders, P. O. orders and checks payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Timothy W. Sprague, Massachusetts Institute of Technology, is our representative at Boston, Mass. Mr. C. C. Haskins, 118 La Salle Street, Chicago, Ill., represents the REVIEW in the West.

NEW YORK, JULY 14, 1888.

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These are interesting times in electric light circles. Meanwhile, read the REVIEW regularly, advertising pages, patent list, and, occasionally, you may find it of value to read what appears on this page.

How would the street car companies of New York enjoy being ordered by a city commission to run all their cars overhead? We are almost as nearly ready for this, as for burying the wires in the streets of New York.

No, no, Messrs. Board of Controllers! You must not ask electric lighting companies to bury their wires until your underground system is ready. They could have put their wires in the sewers long ago, had they not desired to continue in business.

We do not think that Electrical Expert S. S. Wheeler, who is a capable and practical electrician, can endorse the attempt to bury the electric light wires of New York, as ordered by his Board of Electrical Control, while the conduit system is so incomplete as at present. We hope to see a little practical, every-day electrical wisdom gradually permeate the actions of this Board, with Mr. Wheeler as its electrical expert.

The examiners in both divisions of the class of electricity, in the patent office, have been doing great work the past few months, and ere long we hope to find them abreast the tide of invention, ready to act upon cases immediately. Considering the intricate and difficult character of the work, the lack of equipment, the great number of applications, and the scientific ability requisite to the proper disposal of the business, this part of the patent office deserves very great credit.

The work of Dr. Lugo, illustrated in this issue, is a powerful example of what may be done by applying the wand of modern improvement to old forms and devices. To look at, the Lugo motor seems an insignificant rehash of some of the old philosophical apparatus for years the only exponents of the conversion of electrical into mechanical energy; but an examination will develop the pretty germ of invention which gives it a high place among the practical movements in modern electrical science.

Messrs. Theo. N. Vail, president, and Jno. A. Seely, electrician, of the Metropolitan Telephone and Telegraph Co., deserve the thanks and praise of the telephone fraternity, for their recent interesting and valuable work, which is shown elsewhere in this issue. The beautiful simplicity of everything is the merit of the invention. The adaptability to the purpose, the great facility which is afforded for rapid work, and the perfection with which the various functions are automatically performed are all evidences of invention of a high order, and of the complete mastery of their profession which has been attained by the two gentlemen, above named. The REVIEW heartily congratulates them, and trusts the value of their work will be fully recognized.

A VALUABLE PRIMARY BATTERY TEST.

Messrs. Alabaster, Gatehouse & Co. have done a good thing in making a careful report on the Weymersch battery, and its projectors have done a public service by permitting its publication in full. They make no absurd claims of "current for little or nothing," and have not perched upon the pinnacle of self-conceit and proclaimed the doom of the dynamo. They have simply made a marked improvement in depolarizers for batteries of the Bunsen type, and have attained certain distinct results. Would that others followed the praiseworthy example. But then the poor lambs could understand, and would refuse to be fleeced, and the occupation of the promoters of wonderful primary batteries would be gone indeed, and the millenium would be close at hand.

A HOMERIC NOD.

A semi-occasional drowse is excusable, or, at least, not reprehensible, in almost any position in life. Henry Ward Beecher once said that he never thanked a man for awaking a sleeper in a pew, for if the person went to sleep, it was a sure indication of natural instinct that the man needed the sleep more than the sermon. Yet, how few ever went to sleep under the ministrations of that great preacher, whose lifework sought to make the teaching of Christianity equal to all the issues of human life.

But there is one place where a person must not fall into a drowse, notwithstanding that the well-known phrase of Horace,

"Et idem
"Indignor quandoque bonus dormitat Homerus;
"Verum opere longo fas est obrepere somnum,"

has been often quoted as an excuse for all kinds of lapses. As we have made the quotation to show how much we know, we here insert the translation to tell what it means: "I, too, am indignant when the worthy Homer nods, yet in a long work it is allowable for sleep to creep over the writer."

The occupant of the editorial chair must be awake to seize upon the vital points that are contained in the specialty to which the paper is devoted. As Gladstone once said that the orator returns as a shower the thoughts and sentiments which he has received rising in mist from his audience, so the editor must give his readers in concrete form the results of the latest types of thought derived from the contributors to his paper. It is not merely from the contribution, but also from an immense number of letters never designed for publication, that the editor of a journal like this is always receiving help, support, and criticism upon matters pertinent to the policy of the paper.

To be sure, there is something which every person thinks he could have done for a livelihood other than his own vocation; sometimes it is to have kept a hotel, or to have been a musician, but generally it is to have run a newspaper. Such pleasing fancies are more commendable than most fads, inasmuch as they do the soul of their owner a vast amount of good, and, like the wrigglers in the cheese, will not do any one else any harm.

It is not that class, however, which we have in mind when we make acknowledgments to the friendly endorsement of a great number of readers personally unknown, perhaps, to the editor.

A few weeks ago, we were able to share this by reason of a slight mishap which cannot be attributed to any compositor or office cat, but, as Dr. Johnson said, when asked to excuse an error in his dictionary, "It was ignorance, pure ignorance, madam." In this case, however, we must say that the error was inadvertent and acute ignorance, if you please.

In the editorial of our issue of the 24th of March, while considering the question of the hypothesis upon which inventors were apt to reach out to their direct results, we called attention to the well known fact of the circumstances of the invention of the self-acting steam engine, and by means of some total depravity of inanimate things, that is to say a slip of the pen, credited the boy who made the invention with using an eccentric upon the shaft of the engine. What we meant to say was, "derived from the eccentric motion," which was indeed the method used in placing the pin upon the walking beam which connected with the devices operating the valves.

The slip was noticed shortly after going to press, but since the historical error did not in any way affect the line of thought of the whole editorial, correction was withheld from the next issue in order to learn whether the error would be noted by our readers, serving both as a measure of their acumen and intelligence. We have been in receipt of numerous letters calling attention to the error, expressed in kindly phrase, and frequently stating that they should not have troubled to call attention to the matter were it not that they had found the editorials of this paper so accurate. In fact, we have felt more than complimented by the character of the corrections that have been made.

Having made a confession on our own part, which is doubtless good for the soul, we wish to refer to the shortcomings of others on this question. There is not a technical paper in the country with a policy more broad than the ELECTRICAL REVIEW, in affording to other papers more facility in the way of granting permission for the reproduction of any of the many original articles published in this paper. It is our desire to advance electrical interests to the greatest degree, and the most potent means are those of widely disseminating correct information regarding electricity both in matters respecting its scientific principles and practical applications.

As in the case of the friendly criticisms of our readers, we have felt a certain degree of commendation on seeing the articles original with the ELECTRICAL REVIEW appearing in our exchanges. But in those instances where the editors have apparently forgotten their source, or at least have neglected to give credit for their origin—it may have been like the youngster who thanked the lady for the candy but did not tell her so,—we have never fallen into a passion and told the offending parties to

Use their own scissors and trim their own ears,
And not write editorials with paste-pot and shears.

We are glad to see electrical interests advance, even in this manner; although after they have tried the method of surreptitious cribbing, and then that of honest credit, we are sure they will be convinced that honesty is the best policy, like the declaration of the dying Scotchman who said he had tried both.

THE SUBWAY COMMISSION AND ITS PUMP.

On dit, the New York Subway Commission has invented a Combined Leakage Motor and Pump, the motor and pump being intended to be imbedded in the concrete structure to catch the stray currents in the act of leaking —*in flagrante delictu*, as it were—and compel them to useful service in operating the pump to keep the often water-filled ducts dry. The device would be automatic—the more the leakage, the faster the motor would turn and the harder the pump would work, like the piper who cannot pipe till he "wets his whistle." It takes a brainy brain to evolve such a beautiful and reliable invention, and the Commission is to be congratulated. But why not continue the phosphorous diet to the extent of another whale or two, and possibly the pump might be invented which would do away with wires and cables and pump the electricity right through the ducts? You can't have leakage from a wire, if the wire be absent The evolution of the pump will be interesting.

BOOK REVIEWS.

Hall's Patent Estate.—This is a treatise on the character of property under a patent grant, its legal surroundings and its extent.

Two great subjects stand at the threshhold: the nature of an invention, and the property right in reference thereto. The author holds that inventions of machines, manufactures or compositions of matter, are incorporeal, the articles respectively embodying, but not constituting an invention; that the property right is a mere claim in law to an exclusion in fact, giving no property in the invention itself, and no claim to use thereof.

The book treats of the ascertainment of patent profits, the distinctions between profits, respectively, of the patented invention, business touching the latter, infringement of the patent, and the patent.

The important new position is advanced that one part owner may have partition of the patent, which, if hereafter adjudicated by law, must place in severalty a vast amount of co-owned property now unproductive to certain of the co-owners.

Account and infringement between patent part owners are separately considered under a range of authorities not heretofore assembled. Every intelligent patent owner should read this work. Published by Ingham, Clarke & Co., Cleveland, O.

Twelve calls a day is said to be the average number for each telephone in Kansas City, Mo. We think this is the largest average of any exchange in the country. What have our other large exchange managers to say to this?

OUR CHICAGO LETTER.

(Special Correspondence.)

There is a certain amount of bang and fizz to a national holiday, such as that just passed, which one cannot well avoid; but I do think that any one who deliberately distributes a million huge cannon fire-crackers, to be exploded at the same instant, should have his nefarious scheme—and especially when the hour set is as unseasonable as 1.30 A.M.—stopped by the U. S. Marshal. It was a pretty scheme, but it didn't work here. Only one recipient tried to burn his portion of the fireworks, and the blooming thing, fortunately, refused to go. As Napoleon III used to say to Dr. Evans, "I wouldn't have thought that of Eugenie."

Western electricians are by no means pleased at the refusal of Commissioner Hall to grant a patent to Dr. A. de Bausset for his air-ship. The commissioner, after the examiner, says that the scheme is not feasible, and is not new, as well as not practicable.

And this is not the first instance where the inventor has been snubbed simply because his ideas were in advance of the age. When Robert Fulton's steamboat was ready for her first trip down the Hudson, not a few very wise men said, with great positiveness, that while with the current the little craft might reach New York, she never would be able to get back.

When it was proposed to cross the Ocean by steam there was no end to the list of men "who by education and experience are qualified and competent to give the subject careful and scientific investigation," pronounced the scheme "wholly impracticable and impossible."

Nearly all the mechanical engineers of the old world pronounced the Ericsson screw propeller a grand failure in advance, but somehow the wheel, as of old the world, "still moves."

During the war, after an immense amount of labor and argument, a vessel of the ram order was built from lines furnished by Mr. Rollin Germain, of Buffalo. Despite the fact that the vessel was the subject of ridicule, and its inventor bore the reputation of a crank, that, according to men "who by education, etc.," the vessel would sink, the moment she struck the water, she astonished these educated gentlemen by sitting in the water as gracefully as a swan.

The quartermaster, under whose charge she was built and launched into the Ohio, actually had a line attached to her made fast to the wharf, for fear that after having once started down stream, she could never return against the current. She proved to be the fastest boat in the navy, and was used by Admiral Porter as a dispatch boat.

So much for that wonderful intelligence which by means of "education and experience, is qualified and competent" to give an intelligent opinion at sight upon a proposition which is the result of years of study, of mathematical provings, and of applied mechanical laws.

Dr. de Bausset's, or some similar balloon, will yet look down from the upper air upon his detractors and calumniators.

Monday night was a field night for electricity in our City Council. First came the Sun Electric Light ordinance. This document purposes giving the company the right to lay wires to furnish light, heat, power and signals, between Adams and Twenty-second, and the lake and Chicago River.

The first whack came in the shape of an amendment requiring the company to pay five per cent. of its gross receipts into the city treasury. The amendment was carried by a vote of 28 to 17, after a tussle to change this figure to two and a half per cent.

Then the amended ordinance was passed by a vote of 27 to 19. A petition for a second franchise came up. This asked permit to occupy and exploit from Superior to Chicago avenue, between Halsted and Ashland avenue, and between Milwaukee avenue and Halsted street.

The same five per cent. amendment was attached as before, and the ordinance went through.

The Consumer's Electric Light Company's ordinance asked for a franchise to occupy the territory on Blue Island avenue, between Harrison and Twelfth streets, and between Twenty-second and Henry streets, and from Twenty-second to Harrison along Halsted. Seven minutes were all sufficient to carry this scheme through, which included the attaching of the amendment, and all other delays.

Three minutes then sufficed to pass the Co-operative Electric Light Company's ordinance, amended like the balance of the ordinances.

Mr. D. P. Perry of the Sun Electric Light Company, who was present, seemed to think that the 5 per cent. payment clause of the ordinance was too great a load for his corporation to carry, and he was afraid to say that the ordinance would be accepted. A provision of all the ordinances is that:

The company shall build conduits of their own and shall allow the wires or conductors of any other person or persons, company or corporation, to be placed in said conduits at an annual rental equal to that charged by any other conduit company. They shall permit the City of Chicago to use the conduits free of cost to said city, and where streets or alleys shall be crossed by connecting lines, wires, or conductors, which are run under or in sidewalks, such lines, wires, or conductors shall be laid as directed by the Commissioner of Public Works. All such lines or wires shall be underground, properly insulated, and shall be constructed under the supervision and to satisfaction of the Commissioner of Public Works, or such other officer or department of the city government as may hereafter be designated by ordinance to perform the duties of such Commissioner. No wires shall be laid, unless a plat shall be filed with the Commissioner of Public Works designating the streets, squares, and alleys in which it is proposed to locate the same, and a plat of the circuit of wires completed shall be filed with the Commissioner of Public Works before the same are used, and any change in the same shall be reported to the Commissioner of Public Works.

There is a quite wide spread belief that our Mayor will veto these several ordinances.

Alderman McGregor gave notice of action against the telephone monopoly at the council meeting last evening. He moved that the law department be directed to prepare a new ordinance for the telephone company limiting its charges to $75 per annum per instrument. The council passed the order unanimously, and the ordinance will be considered at the next meeting as a special order.

Mr. Geo. Foster, of Kansas City, formerly with the Edison Company, was also in the city during the week.

The regular meeting of the Club was postponed on account of the absence from the city of President Barton, who is East on business. At the next meeting, Mr. W. S. Andrews will read a paper—this being the eighth of the series—on the "Alternate *vs.* the Constant Current."

On Friday, the 6th instant, Alderman Thomas C. Clarke, of the Chicago City Council, died of an acute attack of peritonitis, superinduced by overwork in the capacity of assistant sergeant-at-arms during the late convention. In the death of Alderman Clarke, who was one of the most popular, respected and valuable of our council, electrical advancement loses one of its most valued friends. He, as chairman of the Fire and Water Committee of a former council, was mainly instrumental in securing our city electric light plants. In connection with Prof. Barrett, he aided in the scheme of lighting our City Hall, the tunnels, and the bridges and viaducts. He made a gallant fight on the question of an electrical appropriation, and to him the credit is mainly due of obtaining, against heavy odds, the setting aside of $60,000, as the nucleus of a fund for electric lighting in the Southern Division.

He was the originator of the bridge telephone idea, and made many valuable suggestions in the matter of details in carrying out the system, and at the time of his death was perfecting a solution of the much vexed bridge difficulty.

Mr. R. E. Rivers, mine host of the St. Charles Hotel, New Orleans, recently closed a contract with the Western Electric Company here for an additional annunciator of the company's latest pattern, embracing 320 numbers. C. C. H.

Chicago, July 9th, 1888.

OUR BOSTON LETTER.

(Special Correspondence.)

The electric railroad of the Lynn and Boston Railway Company at Revere Beach, Mass., which is the first operated for public travel in Massachusetts, is now in full running order. The first car was, as predicted, run on July 4th, and met with good success despite the sandy and dusty condition of the territory over which it travels.

The overhead wire, cross suspension system with upward pressing contact wheel is used. The cars are supplied with two fifteen horse-power Thomson-Houston motors, one for each axle of the car. The reason for using motors of such large capacity is that on some occasions it may be necessary to have a train of two or more additional cars. The motors are so designed that any speed from 4 to 30 miles an hour can be obtained.

The line runs parallel with the beach along Ocean avenue, and extends from the station of the narrow gauge railroad at Crescent Beach to the Atlantic House at Revere Beach. This, with the line from the Crescent station to the great Ocean Pier makes a total distance of one and one-third miles. The current for the motors is obtained from one 40 horse-power, and one 80 horse-power generator at the new electric light station at Beachmont. This station has a steam capacity of 800 horse-power, and is operating two Thomson-Houston arc light machines which furnish current for 200 arc lights. It is also operating a 500 light incandescent alternating dynamo, and it is expected that another machine of the same capacity will soon be running. From present indications, Massachusetts does not seem slow to adopt a good thing when it is presented, and this railroad, together with the one which is being built and equipped at Salem by the Sprague Company and which is expected to be in full operation shortly, shows that the public appreciates the value of electricity when compared with the horse or cable as the motive power for the propulsion of cars on street railways.

During the past two weeks the local electric light company of Athol has been busy erecting a plant and setting poles for the lighting of that town by electricity, and last night everything was completed and the lights were run for the first time. The president of the company is Mr. Augustus Coolidge, and the treasurer is Mr. F. A. Sawyer, of Portland, Me.

Last evening the citizens of Woburn, Mass., held a town meeting, with a large attendance. The trustees on the library were instructed to lease, for a term of years, a portion of the library lands to the Woburn Electric Light Company, for the erection of an electric lighting plant.

Before the Lowell City Council, on July 3d, Messrs. Sherman, Stuart, Stevens and others, presented a petition asking for the location of a street railway between Lowell, North Chelmsford and Chelmsford Centre. The line will, if the petion is granted, be operated probably by electric motors.

The town of Everett, Mass., has decided to establish an electric lighting system for the illumination of the town. Ten arc lights and 80 incandescents will soon be placed in position.

Mr. George E. Claflin, of Providence, has taken the New England agency for the C. & C. Electric Motor Company of New York, and has just opened an office at room 27, 19 Pearl street, Boston. Although the office has been open only about a week, Mr. Claflin has closed contracts for supplying motors and fan outfits for several hotels and offices in the city.

President Whitney and other officers of the West End Street Railway Company left Boston yesterday for another inspection of electric railways at Richmond and other cities.

Mr. Hollon C. Spaulding, of the motor department of the Thomson-Houston Electric Company, has been down East during the past week, on business, and is expected home to-day. L. A. F.

Boston, July 8, 1888.

Mr. Geo. E. Fisher, of Detroit, Mich., was a New York visitor last week. Mr. Fisher has charge of the Accumulator Company in his city, and is doing a large and satisfactory business, and is lighting a number of business houses and residences in Detroit.

OUR PHILADELPHIA LETTER.

(Special Correspondence.)

The City of Camden, N. J., has at last emerged from the gloom of gaslight, and will illuminate a portion, at least, of its streets by electricity, having just now contracted with the Camden Lighting and Heating Company for 36 full arc lamps of the Thomson-Houston system at the rate of $146 each per annum; the contest between the gas and electric companies has been one of the bitterest on record, inasmuch as the latter has been striving for four years to induce the city to give them a show, but always in vain, and they are now to be doubly congratulated, both for their success and for the plucky way in which they have fought and won the battle. The gas company had the offer made them first to put in the electric plant four years ago, but held the enterprise of their city and its inhabitants in so little esteem that they rejected the opportunity afforded them on the ground that Camden would never support an electric light plant; now, they must see their mistake. The electric plant is in first-rate condition, using both T-H. arcs and Schuyler series incandescents on the same circuit.

Tisdall, of the Brush Company, has scored two more successes in securing the contracts for lighting the building of the *German-Democrat*, on Chestnut street above Sixth, with a 300 light incandescent plant, and in supplying all the apparatus for a 700 light incandescent plant for the shopkeepers mutual lighting enterprise, covering five blocks of shops on Frankford avenue north of the Kensington depot. He says he got good round prices for both plants.

Holbrooke has recently completed his installation of a Westinghouse electric and steam plant at the residence of Mr. Nelson F. Evans, at Bradford Hills, the new summer resort on the line of the Pennsylvania Railroad, 30 miles from Philadelphia; the noteworthy feature of this plant lies in the fact that the dynamo and lamps are alone relied upon for the means of illumination, no other light-giving source, in the shape of gas, oil or candles, being held in reserve in case of temporary failure of the electric apparatus. Consequently, everything known to the art has been supplied to render results of absolute reliability, and the plant is in all things a model of what such an installation should be. No money has been spared by the owner, and doubtless he will find the expenditure well placed. The steam engine is of the Westinghouse, Jr., type, and is used in the day-time to force up the water supplying the house-tanks, not only for the two houses already erected on the crest of a ridge overlooking the famous Chester Valley, but also for those new residences about to be built in the immediate neighborhood.

Merle J. Wightman, the recent electrician of the Schuyler Company, but now connected with the Thomson-Houston Company at Lynn, Mass., has been on a visit to Pennsylvania this week in the interests of his company; he is immediately concerned in the great stride recently taken by that corporation in the matter of power apparatus, both for railroad and stationary motors, and is very enthusiastic over the prospects of the T.-H. system in that direction, and also in the matter of the Thomson system of electric welding; great as has been the success of the company in the matter of lights, he is of the opinion that its motor and welding business will soon be regarded as of equal importance, both from a pecuniary point of view and from the fact that in the power line they possess some of the most valuable patents in this country. On the subject of electric welding, as we all know, there is no question that Professor Thomson's system, and the appliances for its practical use, are far in advance of all others. S. H.

Philadelphia, July 9, 1888.

UNDERGROUND CABLE GUARANTEED.

The Standard Underground Cable Co. has just closed a contract with the Brush Electric Illuminating Co., of New York, for furnishing and placing in position in the New York subways between 14th and 84th streets, in Broadway, a little more than one mile of 8 conductors, No. 4 B. & S. G. arc light cable.

This is the first contract made in New York for underground cable to be used for arc lighting.

The Standard Underground Cable Company guarantees the cable.

TELEGRAPHIC

.... The Western Union Telegraph Company is erecting a copper wire to connect San Francisco and Los Angeles.

.... The Central and South American Telegraph Company has declared a quarterly dividend of 1¾ per cent. The officers of this company are James A. Scrymser, president; E. D. Adams, vice-president; James R. Beard, secretary; Samuel C. Blackwell, treasurer and auditor.

.... A new telegraph line, known as the Commercial, is to be extended from Portsmouth, N. H., through Biddeford and Saco and as far east as Portland. Already the line has been extended through Kennebunk and the poles have been set to Day's crossing upon the line to Biddeford. Seventeen of the linemen have quartered at the Boston and Maine restaurant in Saco and ride to and from their work in teams. Whether the line is to be extended farther east than Portland the company has not yet decided, but it probably will not be this summer.

.... Manager Tillinghast, of the Western Union Company, Buffalo, very pertinently suggests to the people of that city who are insisting on the burial of all the wires, the propriety of inquiring why it was that the city of Buffalo did not remove its police and fire wires from the poles and put them in the conduits, if the conduits were ready as claimed, thereby furnishing an example for the electrical companies to follow? The city had so few wires, comparatively, that it would seem to be a very simple matter to put them underground, if what was claimed by the advocates of underground wires were true.

.... The superintendent of the Fire Alarm Telegraph, of Cleveland, Ohio, in his annual report for the year ending Dec. 31st, 1887, after referring to the number of new poles set and old ones removed, and quantity of new wire strung and old wire taken down, says, "7,384 feet of Okonite insulated wire was placed and works well." Further on in the report, referring to underground wires, he says, "The Okonite insulated wire is working much better than any aerial line now in use in this department." The manufacturers of the Okonite wire for aerial and underground purposes, report business as being very good.

.... George Buckel, the genius, whose various electrical inventions have gained for him considerable notoriety, has decided to abandon the follies and vanities of this moving world, and to devote himself to a life of penance and mortification behind the gray walls of the Trappist Monastery at Gethsemane. George Buckel is in many ways an interesting character. He is an upholsterer by trade, but since his boyhood has spent his spare hours in studying electricity and applying his talents to the invention of different apparatus. Some of his schemes have been plausible enough, but others have been more imaginative than anything ever conjured from the fertile imagination of Jules Verne. With proper training Buckel might have made himself famous, but his erratic efforts have never accomplished any permanent result. Buckel will become a full-fledged monk and will never leave the monastery until a solemn cortege of cowled monks deposits all that's mortal of him in the little churchyard outside the walls.—*Louisville (Ky.) Commercial.*

Telegraphers Growing Restless.

Considerable activity has been manifested for some time past in the ranks of the Telegraphers' brotherhood, and is stated that an important and secret meeting of leaders from several sections took place in this city last week. The general impression prevails that the telegraph operators are determined to avail themselves of the busy, rushing, restless activity and excitement of the Presidential year, and will ask reasonable concessions from the companies at a moment when they cannot very well be ignored, as they were five years ago when they were not recognized by the company.

OUR LETTER FROM VIRGINIA.

(Special Correspondence.)

There is probably no other city of its size in the United States that is as well equipped electrically as the City of Richmond, Va, and there is probably no other city in the world where its inhabitants take such a universal interest in the success of, and are as proud of, the electrical devices used for the various purposes, as those of Richmond. The Electric Railroad is the longest, has the most cars, carries the most people, runs at the least expense, has the least trouble, has the heaviest grades, has the shortest curves, and has cost the most money to build of any electric railroad in the world. The REVIEW has contained notices from time to time of the progress of the construction of the road. The company has recently purchased the rival road, giving $300,000 for it, so that in all the Richmond Union Pass. R. R. Co. own over 40 miles of track and are running 15 miles of electric road. The old road will be as thoroughly equipped as the new one, and will probably have electricity as the motive power on the old road, using the same system that has been so successful on the new road by October 1st. It is a delightful ride from one end of the city to the other on the electric cars, over the many hills and through the historic streets, that never fail to interest the stranger as well as the citizen. The smiling faces of the stock holders show that they are well satisfied with their investment.

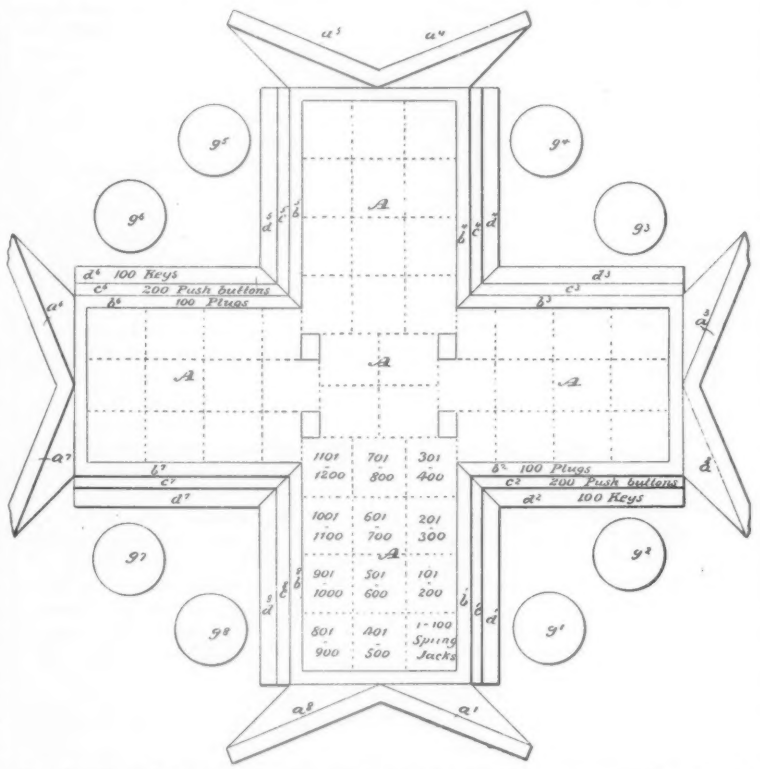


FIG. 2.—VAIL & SEELY'S TELEPHONE SWITCHBOARD IMPROVEMENTS.—TOP PLAN OF BOARD.—G¹ to G⁸ INDICATE LOCATION OF OPERATORS.

The principal streets of Richmond are lighted with 127 Schuyler lights, and about 250 are used besides for private customers. The Virginia Electric Light and Power Co. who, about January 1st, this year, purchased the old arc plant, have made a number of very great improvements since that time. They have increased the capacity of the arc plant; they have purchased the franchises and plant of the Old Dominion Electric Light Co. located at Manchester—across the James river from Richmond—and have moved the whole thing across the river to Richmond without losing a light or customer.

They have, within the past three months, constructed and have in operation 2,000 incandescent lights and are putting in 3,000 more, nearly all of which are constructed, for the fact is they cannot supply the demand fast enough. The Westinghouse alternating system is used entirely and is giving perfect satisfaction. Many of the lights are three miles from the station, and they are distributed an average distance of over one mile and a half from the station. They are put into residences, all the clubs, post office, hotels and business houses.

They have constructed and have in operation also a separate circuit for power alone, and are running a number of factories and elevators. A novel application of power, probably the first in the world, is to unload cargoes of vessels where the motor is over a mile from the station. It does the work perfectly and promptly, and the proprietors report much more economical than steam. The Sprague motors are used principally with a special 220 volt, 50,000 watt Edison dynamo for the generator. The entire station and plant is under the superintendence of Mr. W. H. Cole who has had exclusive charge of all the construction from the begining, and has also the charge of the power station for the R. R. Co.

They use for the R. R. power six 40,000 watt Edison dynamos and three Armington & Sims engines 14½x15.

For the power circuit they have a 15 horse-power Ide engine and two 65 horse-power Westinghouse engines for the incandescent service. They have ordered six more Armington & Sims engines 14½x15, two to be used for the increased incandescent plant and four for arc service.

Jarvis settings are used for the boilers, thus enabling them to use a cheap fuel. They probably make steam as cheaply as any plant in the country.

The building is well adapted for the purpose, and is handsomely finished in varnished yellow pine. In every way it is as near a model plant as money, experience and skill can make it, and well worthy of a visit from those interested in such matters. Mr. Cole is very busy constructing yet, and does not expect to be completely finished before late in the fall. The Virginia Exposition to be held in Richmond for 40 days, commencing October 1st, bids fair to equal any of its kind, and has attracted attention all over the country. It is in the hands of the most responsible and able citizens of the State.

We have an electrical department under the superintendence of Mr. W. H. Thompson, superintendant of fire alarm, this city, who by the way has invented and has in operation a system of flash lights that works simultaneously with the alarm signal, and any one can count the strokes by the flashes of light from a number of large incandescent lamps placed at different places in the city. The current is thrown on to the lights by means of a relay that makes and breaks the circuit in unison with the strokes of the alarm gong.

The Electric Light Co. have a contract to furnish over 100 arc and 500 incandescent lights for the new exposition buildings now being constructed. There has been considerable discussion as to whether iron or wooden poles should be used on the streets where the new railroad lines are to be put up. It was decided by Col. Cutschaw, the city engineer, after consulting a number of the experts, to use octagon poles painted and steeped, and that all the different electrical companies should occupy the same, under rules and regulations made by the city.

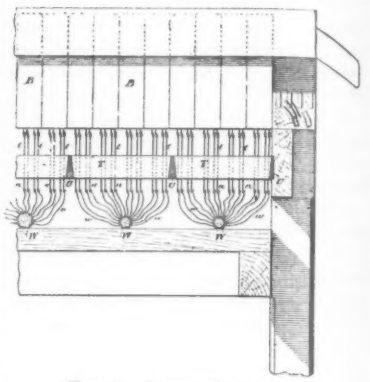


FIG. 5.—CABLE TERMINALS.

The Galleyo mills of this city have contracted with Mr. W. H. Cole for a 50 light incandescent plant. He has adapted the Westinghouse system as being the best for the purpose and will put that in. The wiring is nearly completed.

The Telephone Co. here, under the management of Mr. C. E. McClure, is giving a fair service.

The city of Danville, Va., will soon have an Electric R. R. of the Sprague system, a contract having been made with them, by a local company organized within the past few days with a capital stock of $50,000. Lynchburg, Va. is about to use electricity upon her streets for transit.

Mr. C. C. Edwards represents the Sprague Motor Co. here, and probably entertains more enquiring visitors than any other agent in the country. He is very popular.

Richmond, Va., July 3. C. W.

Manufacturing Notes.

The Thackara Manufacturing Company, of Philadelphia, have recently issued a large catalogue of illustrations of their electroliers and combination gas fixtures. A large number of very handsome and new designs are shown.

The Electrical Accumulator and Lighting Co. of Detroit have installed 2,000 incandescent lamps this season, all of which are now in daily use and maintained by accumulators furnished by the Electrical Accumulator Co. of New York.

Messrs. Holmes, Booth & Haydens, have recently printed and copyrighted a table of incandescent lamp leads, prepared by Mr. Geo. B. Prescott, Jr. This table shows the sizes of wire required to carry from 1 to 1,000 amperes from 10 to 10,000 feet, at 1 volt fall of potential. All customers who send for this table, addressing the company at 25 Park Place, N. Y., will receive a copy.

The Sprague Electric Railway and Motor Company have just closed a contract for People's Railway, Scranton, Pa. The number of cars to be equipped will be 20, full-size, new 16-foot cars, Broadway style. Total trackage, 12 miles. This is the principal railway in Scranton, and covers almost the entire city. Steam plant to be of the most approved construction, and as complete in all its details as that at Richmond.

The Board of Public Affairs, Little Rock, Ark., closed a contract with the Fort Wayne Jenney Electric Light Co. to furnish the city an electric light plant for $27,000, with Corliss engine and all neccessary equipment to run 100 arc lights, which are to be hung at the intersections of the streets. The company will enter into a bond of $25,000 to the city that the plant shall be in running order by the 1st of September 1888. The $27,000 are to be paid by the city in four annual payments. Thus the question is settled and the city will have an electric light that will satisfy her citizens.

Vail & Seely's Telephone Switchboard.

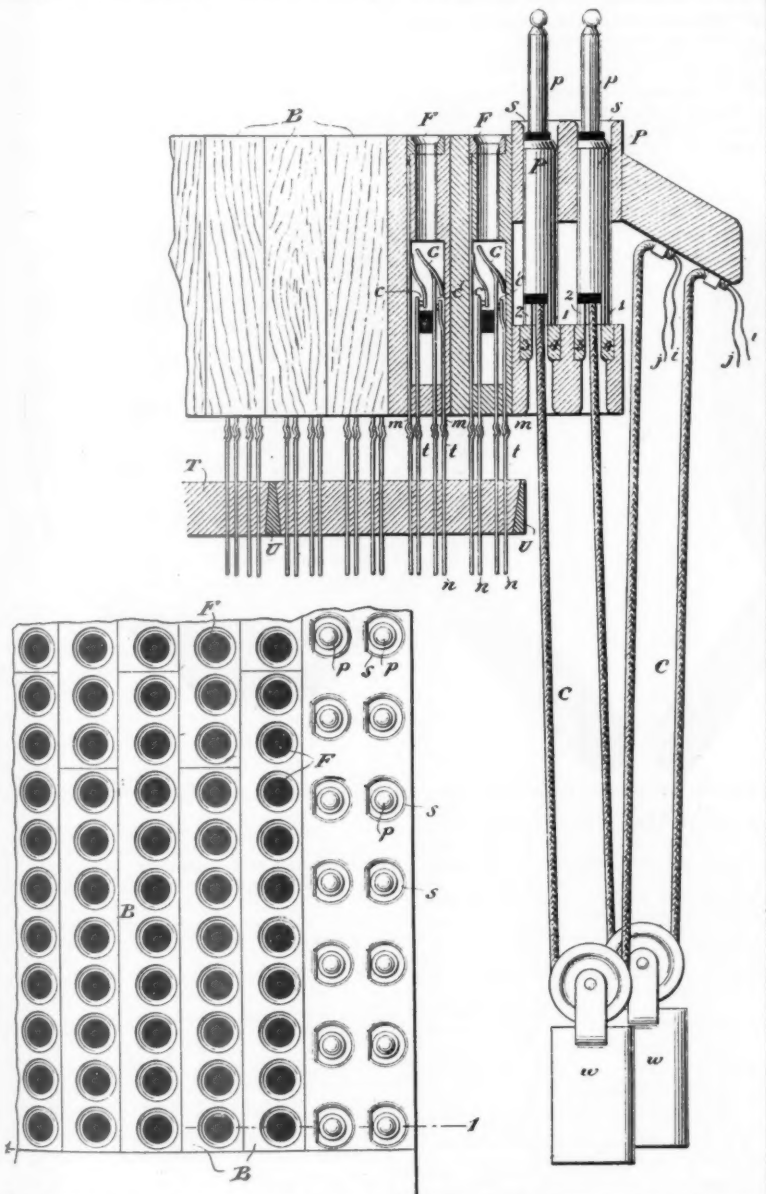
(*Continued from page* 1.)

Figs. 3 and 4 shows details of the board; *c* are spring jacks, *p* the groups of jack plugs; it is to be noticed that there are many details of improvement such as a "dust guard," *G*, for each spring jack, rendered necessary by the question in which the jacks are placed; the plugs, *p*, are so shaped that they can only sink into position in the socket in one way. Each board is "built up;" that is, it consists of a skeleton frame work; the jacks fit into position in sections of six or twelve and have projecting spring terminals as shown in Fig. 5; cables come to the board having blocks of wood, *T*, carrying spring blades, one of which is soldered to each conductor; these spring blades register with spring blade terminals fixed to the spring jack or other apparatus; it will thus be seen that the boards are "built up"; parts are interchangeable, and changes, alterations and repairs may be rapidly made; above all, a soldering iron need never be brought near the board.

In addition to the requirements in the construction and management of the boards themselves, important improvements and a great saving in expense is made in the process of and apparatus for signaling between the central and sub-station.

It is proposed to use metallic circuits, and to supply each operator with a head telephone and a transmitter, which are to be kept constantly in position for use. Each group of sub-station lines is connected in parallel with a low resistance receiving telephone, and by this means magneto bells are rendered obsolete, no preliminary calling being required. In Fig. 6 is shown the flexible cord, *c*, and jack-plug, *P*, having insulated electrical contacts, 20, 21, at its base; strips 22, 23, are connected to a head telephone, *T*; every circuit of the group rests in a similar manner upon the strips, and is therefore in parallel circuit with head telephone, *T*. The subscribers' station is also shown in Fig. 6 at *B*. There is no magneto bell used; the calling station simply lifting his head telephone, announces his own number and the number of the called-for station. *C* is a single stroke electro-magnetic bell, and *a* is an auxiliary switch arm, which, when depressed, places a battery (which may be the regular transmitter local), in the main line. As soon as the sub-station has called for the desired correspondent, he depresses lever *a*; this throws battery into line, and attracts the bell magnet armature; the central station in the act of making the called-for connection, lifts the plug, *P*, and breaks circuit; the bell, *C*, responds and indicates to the sub-station the action of the central station; the lever, *a*, is immediately released. In each circuit at the central station is a ringing off annunciator; at the substation there is a tumbler lever, *i*, connected to the main line; upon the gravity switch arm is an insulated contact point; there is also a hook on the gravity arm in position to take against the tumbler lever on its upward movement. Now, when the telephone is lifted from the gravity arm, *g*, this hook carries the tumbler lever, *i*, far enough to change its center of gravity, and it tumbles into a position such that the gravity arm, *g*, in its descent carries the insulated contact point forming the terminal of conductor, 17, into contact with lever *i*; during this contact, which is but momentary, the battery is included in the main circuit and drops the ringing off annunciator. It will thus be seen that no ringing nor waiting is necessary; that the cost of apparatus and the space employed, both at central and sub-station, is greatly decreased; that the process of calling and communicating is greatly simplified, and that the apparatus and system generally bear the stamp of practical utility characteristic of the inventors.

It should be said that the keys, *L*, Fig. 5, are for looping the telephone into a connected circuit, or "listening in"; and that there are two keys or push buttons with properly arranged generators for ringing in either direction.



Figs. 3 and 4.—Vail & Seely's Switchboard Improvements.—Details of the Board.

Life Saving Stations to be Connected by Telephone.

All the life saving stations on the Atlantic coast of Long Island are to be connected with each other by telephone, and those isolated from the mainland are to be connected by telephone or telegraph with the nearest villages. Surveyor Boland of the Treasury Department, Washington, is at present engaged making a survey for the laying of a cable between Montauk Point and Rockaway Beach. It is expected that the work will be completed by October 1.

Introduction of the Telephone into Siam.

The plant for the telephone at Bangkok has arrived from Germany. I am informed, says a correspondent, by an electrical expert conversant with telephonic affairs that the instrument is much inferior to the American instrument, costs about five times as much and has not near the power of the Bell; but as the control of the matter was in the hands of a German who has a friend at court, no one else was consulted in the matter, and he had the power to do as he pleased. As it is the Germans are getting a strong hold here with the officials, which is somewhat galling to the English and French residents, who, in the past, had a monopoly of the business. —*United States Reports.*

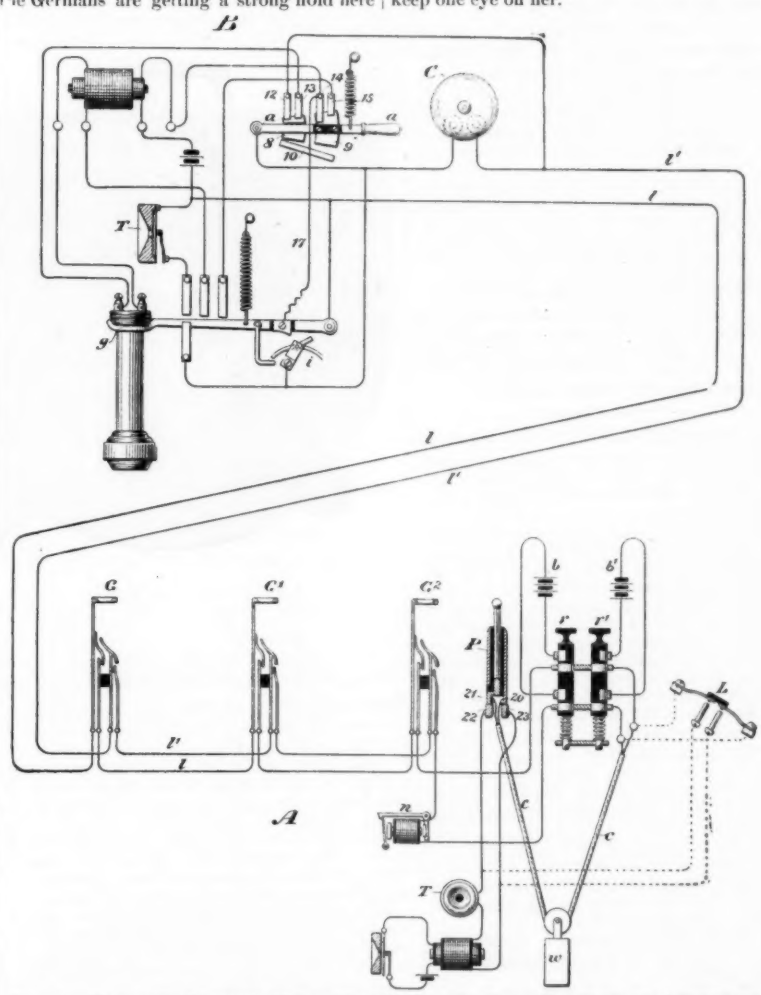


Fig. 6.—Vail and Seeley's Telephone Improvements.—Diagram of Automatic Signalling Apparatus between Main and Sub-Station.

The American Telephone Company.

[Extract from *The La Guayra (Venezuela) News.*]

The American Telephone Company has already placed its wires in position in this city. Tall, strong posts support them, away above the roofs of the buildings. This system has been found to be very convenient. In this city they are now at work putting in the apparatus for various subscribers, and this will be carried on until all are put in, when they will be able to communicate between here and Caracas. The cards are to be printed in a few days. These North Americans are, without doubt, progressive men. More bold than Archimides, they do not ask a favor; their motto is "Go ahead," and they can dim the sun in the west.

.... The telegraph wires are all up on the line between Macon and Machen, Ga., and the latter town will soon be in telegraph communication with the outside world. It is also the intention to connect Machen with Shady Dale.

Telephonic News

⁂ The Sunset Telephone Co. has put up a wire between Sacramento and Woodland, Cal.

⁂ Mr. Henry Smith, chief of the fire alarm telegraph of Buffalo, N. Y., was a New York and Philadelphia visitor last week.

⁂ There are 610 telephone subscribers in the city of Springfield, Mass. A new switchboard is being put in by the telephone company.

⁂ The little brother had watched the baby until he was tired. At last he climbed up to the telephone and shouted into it: "Please, Dod, won't 'oo jes' watch 'e baby till I tum back? I fink it'll do if 'oo jess keep one eye on her."

⁂ The next meeting of the National Telephone Exchange Association will be held in the city of New York, at the Hotel Brunswick, commencing Tuesday, September 4th, 1888. The hotel is on the European plan. If desired, Secretary C. H. Barney, 18 Cortlandt street, New York, will attend to engaging rooms for all who send word to him.

⁂ A Chicago boomer rises to remark: The telephone people needed a multiple switchboard. The good people the other side of the herring pond said that a board which could be multipled so that any operator at any board could make any connection and determine whether a party wanted was busy or not, without interfering with subscribers, would be desirable, but that such a thing was of the "Cawn't do it, ye know," order of problems, and the entire East in our own country echoed the sentiment—but Chicago invented the board, and it has been the only feasible method to date of successfully handling a large telephone exchange.

Work on the electric railway at Asheville, North Caroline, has commenced.

The East-side street railway at Brockton, Mass., will adopt the Thomson-Houston system.

The Thomson-Houston system will be employed on the Salisbury street railway, Boston, Mass.

The Passenger Railway Company of Philadelphia will try a new electric motor in their line soon.

Another contract by the Sprague company is that of the East Side Street Railway of Brockton, Mass. The first equipment will consist of six cars with about five miles of trackage.

The president of the Wilmington, Del., City Ry. Co., Mr. William Canby, has written a letter to the Sprague Motor Company expressing entire satisfaction with the overhead system adopted by the Wilmington Company. Mr. A. H. Chadbourne, of Philadelphia, contracted for this installation in the part of the Sprague Company.

An Automatic Electric Railway Signal.

The Automatic Electric Block Signal System is receiving considerable notice in the Pittsburgh papers. It comprises an automatic signaling system to be used on railway trains, and apparently possesses several valuable and novel features. A practical trial on railway trains, however, is needed to demonstrate its value. Messrs. Thomas D. Williams, John S. Lucock, James W. Clark, George M. Eitemiller and George Morris, are the Pittsburghers interested, all of whom are said to be old-time telegraphers.

If we are not mistaken, Mr. W. T. Waters, hailing from Atlanta, Ga., is the inventor of a somewhat similar system, announced in 1885. In this the signals were all automatic and were verified. The Pittsburghers may find this invention of interest to them.

Electric Light News of the West.

The Western Electric Company has just closed a contract with the Coldwater, Michigan, Electric Light and Fuel Company for a 50 arc light plant.

The bridge matter is still a thorn in the flesh of both the authorities and the dear constituents. The claim now, is that the powers of the various officials is not well defined—it is a mooted question as to what official has control of the telephone dispatches. The harbormaster says the vessel-dispatcher has charge of the bridge-tenders, and that gentleman says he has not. The result is a species of go-as-you-please conduct on the part of the bridge-tenders, and a resultant general dissatisfaction. The vesselmen's committee purpose urging a definite programme of duties, authority and discipline for the tenders, the dispatchers and the water community—after which, peace without provocation.

The electric light as an advertising medium has taken on a new phase in a Wisconsin town. One establishment where the proprietor is having a system put in, has issued a dodger with big head lines.

Chestnuts with the burr on! Six months in the Lyon's den for asking any of the following questions:

1. How long before you will have the electric light running?
2. How many lamps are you going to have?
3. How much will they cost you?
4. Is there any danger in electric lighting?
5. How long are you going to burn them?
6. Can you blow them out yourself?

When you want a good cigar or a shave, go to the corner emporium, and be happy.

Automatic Ground Switch.

The new ground switch is introduced by the Electrical Supply Company, Chicago, and is intended to prevent the shutting down of circuits on account of grounds. Wherever a loop is required the main line is led into the automatic switch, the wire then leads from the switch to the first and last lamp of the loop circuit as in the case of any ordinary cut-out switch. It performs the function of the best hand switches, its operation being instantaneous. Whenever a ground occurs upon this loop, the switch automatically cuts-off the grounded loop, and prevents a general "shut down" of the circuit. The location of the defect or ground is thus pointed out, and saves thereby a long search. The switch is also particularly adapted for the use of motors or incandescent lamps on arc lines, and is also used upon incandescent circuits. The present switch is wound for any ampere current desired; should be placed at the intersection of the service wire and mains where such service wire goes into a building, and where there is liability to ground, or where the wiring passes through combination fixtures. The operation of the switch is to entirely sever the connection from both positive and negative leads, and prevent thereby the bad effects resulting where only one plug "blows," leaving the system still in connection with the ground through the other, as is the case where this switch is not employed.

Fig. 1 of the accompanying cut represents the exterior view of the switch. Binding posts are provided for the terminals of both the line and the loop circuits, which are indicated by the words. The body of the switch is entirely out of circuit, and is made, so far as possible, moisture proof, and is covered thoroughly with a special heavy coating of gutta-percha japan and highly ornamented. The interior portions are thoroughly insulated and covered with a preparation of asbestos, conforming throughout with the rules and regulations of the board of underwriters. The handle projecting downward is for purpose of throwing the main line to the loop. The small button also shown is for purpose of manually cutting off the loop by merely pushing upon same. A padlock attachment, not shown in the cuts, is sold in connection with these switches by means of which they may be locked when cut out, so that no one can succeed in throwing them on while men are working upon the loop.

By referring to Fig. 2, a spring will be seen which connects the two outer extremities of a knee and toggle-joint system of levers, which are disconnected from the switch-arms as shown, the joints of which are brought by the direction of the handle almost exactly into line, and in best position to easily resist the action of the spring. A catch is provided to hold the system of levers in this position, which is operated automatically. This catch cannot be jarred out of position no matter how severe concussion is used. The contacts are of the double-lipped species, are always perfect, and offer no resistance to the passage of the current.

This switch is specially adapted for use upon motor circuits or where motors are operated, in either multiple arc or series circuit, or where incandescent lamps are operated upon arc circuits, these switches will disconnect the loop whenever a ground occurs.

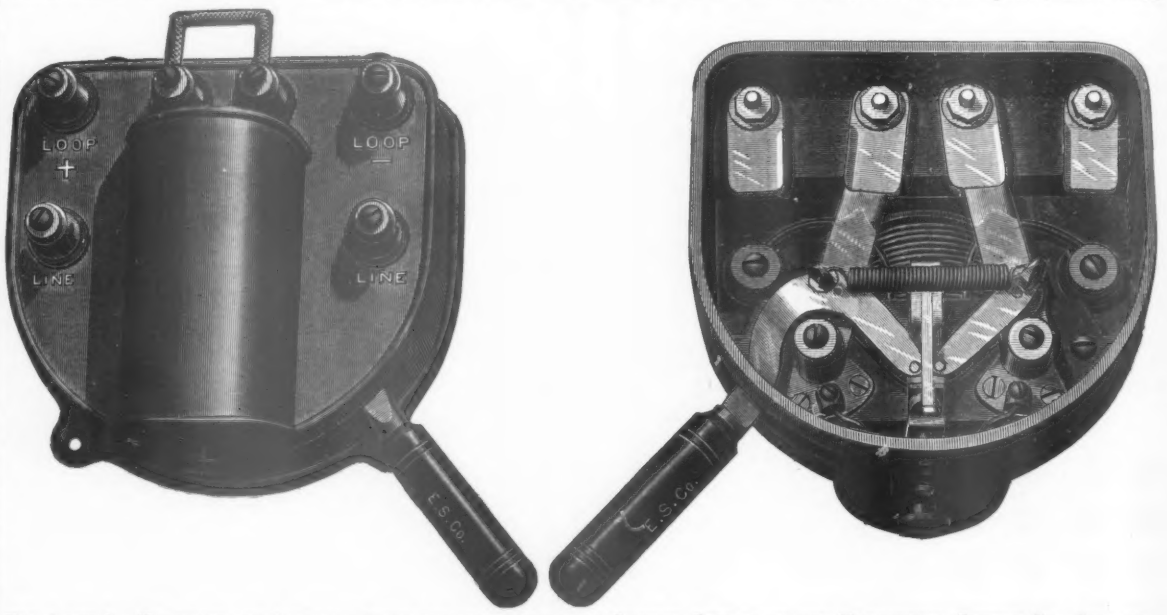


FIG. 1 AND 2.—EXTERIOR AND INTERIOR VIEWS OF THE AUTOMATIC GROUND SWITCH OF THE ELECTRICAL SUPPLY CO., CHICAGO.

Weymersch Battery Tests.

Messrs. H. Alabaster, Gatehouse & Co., editors of the London ELECTRICAL REVIEW, have recently conducted a series of tests upon the request of Mr. R. McKenzie, of a new depolarizing liquid discovered by M. Weymersch and employed in batteries of the Bunsen type. The report is as follows:

A preliminary trial was made with three square, open jars, each having the following internal dimensions: $8\frac{1}{4}'' \times 8\frac{1}{4}'' \times 12''$ deep.

The quantity of liquid, sulphuric acid and water in the proportion of 1 to 20, in each jar was about 16 pints. Immersed in this solution were two $6\frac{3}{8}''$ wide zinc plates to the depth of $6\frac{1}{2}$ inches. Between the zinc plates, and placed in a porus pot $7\frac{1}{4}'' \times 1\frac{1}{2}'' \times 12''$ deep, containing nearly $3\frac{3}{4}$ pints of the depolarizing fluid, was the carbon electrode of the same linear dimensions as the zincs. These cells were connected in series to an ampere meter, the current being adjusted by iron wire resistances to 10 amperes or thereabouts, and kept in circuit for 26 hours. The results obtained showed that the battery ran for 26 hours without the current ever falling below 10 amperes, or varying more than 5 per cent, and with a drop of less than 5 per cent. between the maximum and minimum free potential of the cells, whilst an actual rise in the working or available E. M. F. took place. The measured consumption of zinc in the battery, moreover, was only about 8 per cent. above that indicated by theory.

We then decided to employ another battery of 5 cells precisely similar in all respects to the above, and in the table appended hereto all the necessary data is furnished.

After keeping the cells on closed circuit for $31\frac{1}{2}$ hours, we were compelled, owing to our desire not to leave the battery alone through another night, to put an end to the experiment, although we have not the least doubt that several hours more work could readily have been obtained before the electrical constants were reduced to the extent of rendering it undesirable to continue the readings. During this lengthened run it will be seen that the free potential of the battery did not vary more than approximately three per cent., that the working electro-motive force was practically the same at the end of the test as in the beginning, and that the current varied only between 10 and 10.6 amperes.

The actual and theoretical consumption of zinc differ by only 10 per cent., which agrees closely with the data obtained in the preliminary trial, the weighing of the electrodes in the last run having been carried to a greater degree of precision and exactitude necessitating the employment of grains in balancing plates of zinc each weighing nearly three pounds.

The electrical measuring instruments which had very kindly been loaned to us by Messrs. Sharp & Kent, were independently checked by Mr. H. R. Kempe and Mr. W. M. Mordey. The price per horse-power hour agrees more closely with the theoretical cost of batteries in which zinc is consumed, than that of any other with which we are acquainted, although, of course, the precise figure will largely depend upon the charge per gallon the inventor chooses to make for the depolarizer, which we are informed can be manufactured at six pence per gallon.

TABLE OF WEYMERSCH BATTERY TESTS.

Date.	Time.	Duration. (t)	Current (c) amps.	E. M. F. Volts. Open	E. M. F. Volts. Closed.	Resistance per cell. Ohms.	CEt (external circuit). Watt hours.	Theoretical weight of zinc dissolved. Grammes per cell.	Actual weight of zinc dissolved. Grammes per Cell.	Difference between theoretical and actual consumption. Per cent.	Remarks.
June 7th	11.0 a. m.	.....	10.1	9.26	5.70	.070	.....	.....	.....	.....	From 7.30 p. m. on the 7th June to 11 a. m on the 8th the battery was left to itself $15\frac{1}{2}$ hours.
	12.0 "	1	10.4	....	5.75	.....	58.97	12.436	.....	.....	
	1.0 p. m.	1	10.4	9 26	5.90	.065	60.58	12.618	.....	.....	
	2.0 "	1	10.4	....	6.04	.....	62.09	12.618	.....	.....	
	3.0 "	1	10.5	9.26	6.04	.061	63.12	12.679	.....	.....	
	4.0 "	1	10.5	.....	6.08	.....	63.63	12.740	.....	.....	
	5.0 "	1	10.6	.....	6.08	.....	64.14	12.800	.....	.....	
	6.0 "	1	10.6	9.26	6.08	.060	64.45	12.861	.....	.....	
	7.0 "	1	10.6	.....	6.08	.....	64.45	12.861	.....	.....	
	7.30 "	½	10.6	9.08	6.08	.057	32.22	6.430	.....	.....	
June 8th	11.0 a. m.	$15\frac{1}{2}$	10.5	9.06	5.89	.060	978.70	198.400	.....	.....	Current density 0.12 amperes per square inch.
	12.0 "	1	10.4	....	5.85	.....	61.34	12.679	.....	.....	
	1.0 "	1	10.3	9.06	5.85	.062	60.55	12.558	.....	.....	
	2.0 "	1	10.3	....	5.85	.....	59.65	12.497	.....	.....	
	3.0 "	1	10.2	8.95	5.75	.063	59.45	12.436	.....	.....	
	4.0 "	1	10.2	.....	5.70	.....	58.40	12.376	.....	.....	
	5.0 "	1	10.1	8.95	5.70	.064	57.86	12.315	.....	.....	
	6.30 "	$1\frac{1}{2}$	10.0	8.95	5.65	.066	85.54	18.290	.....	.....	
.....	.....	$31\frac{1}{2}$ hrs.	.....	....	... ...	..... per cell	1955.14 = 391	399.594	439.7	10.0	

We have not hitherto had any battery submitted to us which has given results approaching those above tabulated, and we have no hesitation in expressing the opinion that M. Weymersch has effected a great advance in two liquid primary batteries.

We may add that the liquids did not appear to rise in temperature during the whole period of the test, a fact which we imagine is unprecedented in batteries of the Bunsen type.

It has long been the aim of inventors to discover a primary battery which should give a high electro-motive force, possess a low internal resistance, and give a large and constant current for a considerable period of time with the minimum amount of attention and at the lowest possible cost.

In our opinion, M. Weymersch has distanced all competitors in the attempts hitherto made to fulfil the above conditions.

The Well-Lighted "Omaha."

Charles B. Davis, of the Thomson Houston Electric Company, writes from Guatemala concerning a trip along the Central American coast in the United States Steamship "Omaha": "One of the most attractive features of the 'Omaha' is the electric light. One who has not been down in the officers' quarters on board a man-of-war cannot imagine what a relief is any scheme for keeping these close, small rooms free from the heat and smoke and smell of oil-lamps. That this problem has been completely and satisfactorily solved is shown by the illumination of the 'Omaha' and the gratification shown by the officers and men. The ship is lighted in every part with incandescent lights, not an oil-lamp being allowed on board. In the captain's cabin are handsome chandeliers, with convenient switches for turning on and off the lamps. Every stateroom is provided with a light, and the lights are scattered over the decks in convenient places. The side lights and light on the forestay are of 32 candle-power and found to be satisfactory. Forward of the engine-room, in a small room of its own, is situated a 150-light incandescent dynamo of the Thomson-Houston system, belted direct to an Armington and Sims engine. The apparatus is fitted out with a complete set of testing instruments, voltmeters, ammeters, etc. By the interposition of some resistance, an arc light of 2,000 candle-power is worked from this dynamo, giving excellent results. The vessel is also provided with a focussing lamp of 6,000 candle-power. The whole electrical plant is in charge of Lieutenant Murdock, upon whom the thorough installation and perfect working of the apparatus reflect great credit. Lieutenant Murdock is considered one of the most prominent electrical engineers in our navy, and will be remembered as the author of a most interesting paper read before the Electric Light Convention in Boston last August. By his efforts the 'Omaha' has been made one of the most attractive vessels in the service."

President Lynch Gives His Reasons for Not Using the Conduits—The Lights Not to Be Lighted—What Mayor Hewitt Thinks.

The *Evening Post* says: The action of the Board of Electrical Control in regard to the United States Illuminating Company, was unexpectedly aggressive. The Board sent letters to the President, Mr. E. T. Lynch, to Superintendent Murray, and to Gen. Newton. The Superintendent of Police was informed that all permits to the United States Company for repairing carbons, etc., had been revoked, and he was asked to arrest any one attempting to maintain or continue the lines in any way. Gen. Newton was asked to remove the poles and wires of the company on the streets named in the letter, which were on Broadway, from Fourteenth to Forty-fifth street; on Sixth avenue, from Eighteenth to Fifty-eight street; and all streets from Twenty-third to Twenty-eighth street between Sixth avenue and Broadway. Mr. Lynch was also written to in regard to the whole subject.

President Lynch said: "In regard to the charge of bad faith by the Board, in which it says that the permit to fix carbons, etc., was given expressly on the understanding that the company was about to comply with the demand of the Board to put its wires in the subways, I reply that the statement is misleading. The Superintendent's statement to the Board was construed a little too liberally. There was no intention on the part of the company to make any such promise, and as soon as I found that the Board took that view of the matter I wrote to them telling them that we did not intend using the subways, and stating the reasons therefor. No attention was paid to letter of explanation, and the bad faith is on the other side.

"The second clause of the letter in regard to the objections raised by us against using the present subways are easily answered. There are three reasons against them, electrical, mechanical, and commercial. First, the electrical objections: The Chief Engineer of the Subway Company has said that the subways are wet, and there is no question but that they are. Our men have seen the water pouring out of them. Prof. Morton, who is one of the best electricians in the country, says that a moist conduit would be utterly useless for carrying wires for arc lights, and gives his reasons for his statement. I think that the question is very effectively disposed of so far as it is taken from an electrical standpoint. When such men as Gibbens, Moss and Hess say that the conduit is all right, and Prof. Morton says it is not, there can be little question as to who is right.

"Secondly, taking the question from a mechanical standpoint, what would be our position if we put our wires in the subways which have been built? If we should do so, they would be as much use to us as if they had been laid in Hoboken. When we ask the Board of Electrical Control how we are to use our wires if we put them in the subways, we are told that they are at work upon a system of distribution which will be tried before long. We asked them if we could take our wires out at the manholes and make connections with our customers, and they said 'No!' Then we asked if we could build a subsidiary subway to furnish lights in the middle of the block, and they said no, that they would build one. In fact, an order to put the wires underground is simply an order to stop business. They say, 'you must put your wires in the subways,' but do not furnish any means for using them after they are in.

"From the commercial point of view, the situation is just as bad. I have said very little about it from that standpoint, but just think of the cost. We have to pay $850 a mile per year for our share of the general conduit. Now they coolly propose to build a subsidiary conduit and charge us $1,000 a mile per year for it, and then we only have a single duct. The cost of this conduit is only $4,000 a mile, and four ducts would pay for it in the first year. The rental is enormous. No company could stand it.

"The Board also says that we are the only company defying it. That is not so. The Brush Electric Light Company has not put a single inch of wire into the conduits. They got their permits on promising that their contracts for a cable would be signed immediately. This was three weeks ago, and I know that the contract is not signed yet. In regard to the lights in that district I can say that they will not be lit to-night. We do not care to come in contact with the police, and have our men arrested, so we shall not try to fix the carbons. The lights are all private consumers' and no street lights are furnished by us in that district. We shall not seek a remedy by law, as the question is only a small part of the whole subject, and we had rather have the main point settled. The suit to be brought by the corporation counsel, under the Mayor's orders, will begin in a day or two, and I am hourly expecting the papers to be served. The whole subject can then be brought before the courts and settled once and for all.

"It has been said by the Board of Electrical Control that the wires in Philadelphia and Chicago are working successfully, and they use this as an argument in favor of forcing us to put our wires underground. The following letter from the Secretary and General Manager of the Brush Electric Light Company in Philadelphia very effectively disposes of that statement:

Mr. Eugene T. Lynch, President:

DEAR SIR: Yours of the 16th came to hand during my absence from the city. There has probably been more done to solve the vexed problem of burying electric light wires in Philadelphia than in any other city. The first substantial effort was made about five years ago, when the iron conduit was placed on Chestnut street. While the conduit in point of convenience in my judgment is one of the best, it has been found impossible to get a cable sufficiently well insulated to prevent "short circuits," which from time to time caused explosions of gases which are bound to accumulate in any open conduit. After careful consideration of the difficulties of maintaining our service and the constant danger to person and property by reason of such explosions, it was determined to abandon the system so far as arc light wires were concerned. It is now being used for incandescent work, in which we are using a potential of 100 volts only. Thus far we have had no trouble, and I see no reason why we should have.

The circuit on North Broad street, which was put down by the Chief of the City Department, and from which we are furnishing city lights, is the one so generally quoted as being a success. A part of the circuit has been in use for about three years, a part for the last two years, and a part for the last six months only. It has been fairly well loaded with a current of from 1,800 to 2,000 volts. The fact that we manage to keep the light burning of course gives the impression that it is a perfect success, but in point of fact, it is seldom without "grounds," and has burned out completely several times during the past week. Long experience and careful observation brings me to the conclusion that until some insulation is found that is impervious to all earth influences, it is worse than folly to attempt any general system of underground service. It is quite manifest that no lead or other metallic substance can be used, and for the same reason I question if iron conduits would be admissible, or if open conduits of any kind would, as in the latter case the danger of explosions of accumulated gases would be a constant menace to life and property in the event of an imperfection in insulation. In a word, before anything can be safely done in underground work it will be necessary to have a perfect insulation—a hundred times more necessary than a perfect joint in a gas main. I do not believe such an insulation has been found.

Yours very truly, A. J. DE CAMP.

Mayor Hewitt said the letter to the Commissioner of Public Works calling upon him to remove the poles and wires of the United States Company would have no effect, as the wires were live wires, and he could not touch them. The practical solution of the question was in the suit to be brought at his request. The order to the United States Company to put their wires into the conduit before any system of distribution had been provided ought not to be enforced. He had always held that there was no right in any such proceeding, and the law would not allow it until an adequate general system had been provided. The reason the Brush Company had not been attacked was probably because the Board knew that the company had public contracts and could get an injunction against the interference, while the United States Company could not. It was a very well studied move.

The Greatest Arc Light in the World.

Saint Catherine's light-house, on the southern extremity of the Isle of Wight, now possesses what is probably the most powerful electric arc light in the world. The carbon pencils are 2½ inches in diameter, the interval between them ½ inch, and the light developed equal to 60,000 candles. The lamp is a modification of the Serrin-Berjot type, and the carbons are fluted to promote centrality of the arc. The current is generated by two dynamos constructed by De Meritens, of Paris, the induction arrangement consisting of 60 permanent magnets, each magnet being made up of 8 steel plates. The armature, 2 feet, 6 inches in diameter, is composed of 5 rings, with 24 bobbins in each, arranged in groups of four in tension and six in quantity. The revolving lens is constructed so as to refract the light in 16 radial beams, and this is actuated by a small vertical engine, at such a speed, that flashes of five seconds' duration are given every half minute.

—— The Waterhouse plant of 105 arc lights recently installed for the Joliet Electric Light Co., Joliet, Ill., was quite satisfactory, and the Joliet Steel Co. have placed their order for a 45 arc light plant with the Waterhouse Company as a result of that installation.

—— The city of Rome, Ga., will be lighted with electricity. The Thomson-Houston Company will furnish the electrical apparatus and the Ball Engine Company of Erie, Pa., has been awarded the contract for one of their celebrated steam plants.

—— The Electrical Accumulator Company, of 44 Broadway, have issued a new pamphlet which describes the accumulator and its various advantages fully. This interesting pamphlet will be sent free to interested parties who send their address to the company at 44 Broadway, New York.

—— At the last meeting of the common council, the aldermen of Schenectady, N.Y., decided to accept the bid of the Schenectady Gas Light Company to illuminate the city. The company agreed to furnish the illumination for 37 cents for every electric lamp of 2,000 candle-power, per night, and to light the city every night in the year.

—— Lieutenant Hutchins, U. S. N., has tried a series of experiments to ascertain the likelihood of danger from breaking incandescent electric lamps in explosive gases. Mixtures of hydrogen and oxygen, marsh gas and coal gas with air were exploded instantly upon piercing the globe. A Swan 16 candle-power lamp was used in these experiments.

—— St. Louis is considering the advisability of illuminating the water works and stand pipes with electricity. This city has a splendid system of water works, and is enterprising enough to see that it keeps up with modern improvements. The Fort Wayne Jenney Company will probably do the lighting, the contract having been awarded conditionally.

—— Last week Mr. Edison paid a number of small boys 50 cents each for the privilege of having their dogs a few minutes, in order that his phonograph might take in some varied samples of the canine bark. He paid $1 for the privilege of putting one dog to death. Now, if he would only take a fancy to cats, a number of Orange citizens would supply him with a whole colony, and not charge him a cent.—*Newark Journal.*

—— Mr. W. H. Cole has a number of important contracts for lighting in the city of New York. Among others he is constructing a plant of 1,500 lights for the Elsworth L. Striker estate, which will be a model plant of its kind. The Westinghouse direct system will be used, and every room, hall and store of the 15 buildings now being put up will be lighted, besides the Striker apartment building, and the Alexander building, all run from the one plant. Jarvis sittings will be used for the boilers and a pair of high class automatic engines will run the dynamos. A small electric tramway will be run in the basement of the new building on which a car will be run to carry coal from the street to the storage bins, and will also bring to the street all the ashes and refuse from the building. The exhaust steam will be used for heating purposes, together with enough live steam to complete it.

ELECTRIC LIGHT NEWS

—— The Los Angeles, Cal., Electric Light Company is greatly enlarging its plant.

—— Norfolk, Neb., is asking for bids for the construction and maintaining an electric lighting plant in that town.

—— The Waterhouse incandescent system has been ordered for the lighting of a fashionable seaside resort in England.

—— The Ball Engine Company, of Erie, Pa., will furnish engines for the Newark-Schuyler Electric Light Co., of Newark, N. J.

—— The city council of Newark, N. J., has decided to advertise for bids for city lighting, as the present contract will soon expire.

—— There were five new electric light plants chartered in New York, with a capital of $656,000 during the week ending June 30th, 1888.

—— The Willimantic Electric Light Co. have again increased their plant, purchasing 35 arc lamps and dynamo of the Waterhouse system.

—— Whitestone, N. Y., is desirous of lighting up by means of electricity. Dr. Chas. E. Smith is chairman of the committee. Fifteen arc lamps will be used.

——The Ansonia, Conn., electric road has began to haul freight from the docks to the freight-house in Ansonia. The motor now rounds all curves without trouble.

—— The Ball Engine Company, of Erie, Pa., has been awarded the contract for furnishing power for the Atlantic City Electric Light Company of Atlantic City, N. J.

—— The California Electric Light Company is erecting a three-story brick building, 80 feet front on Townsend street and 275 feet on Clarence place, San Francisco, Cal.

—— A. W. Rireling, late superintendent of the electric lighting works at New Orleans, has been made the superintendent of the electric lighting station in Utica, N. Y.

—— A party named Saline Mud, of Modoc, Ill., is reported to have discovered perpetual motion. A man with that name and locality ought to be able to see clearly through something.

—— A large plant will be erected by the Ball Engine Company, of Erie, Pa., to operate the Thomson-Houston system of arc lighting for the City Gas Light Company, of Norfolk, Va.

—— The Oregon Improvement Company have ordered a plant of arc and incandescent lights of the Waterhouse system for their wharves, machine shops and railroad Station at Seattle, Washington Teritory.

—— The water-power and electric light plant at Norway, Me., has been bought by a party of rich capitalists and manufacturers from Rochester, N. H. Some new business enterprise will be instituted there at once.

—— The Waterville (Me.) Electric Light Company has recently put in a new 500-light dynamo, and especial pains were taken in so securing it to a solid ledge foundation that there should be no quiver or vibration to the light.

—— The Fort Wayne Jenney Electric Light Company is building an immense lighting station in this city, near 80th street and Avenue A, East River. It is to be a model station, worthy in every way of this enterprising company.

—— Arrangements have been completed by which Race street in Cincinnati, Ohio, is to be lighted by electricity during the Centennial. The street is to be swept nightly, wagons kept off and to be utilized as a boulevard for promenaders.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JULY 2, 1888.

385,357 Combined speaking and signaling apparatus; John E. Kelly, Camden, N. J.

385,363 Switch signal; Adelard F. Martel, Montreal, Quebec, Canada, assignor of three-fourths to Jean Baptiste Amede Mongenais, Rigaud & Toussaint Brosseau, and Marie M. Philomene Craig, both of Montreal, Quebec, Canada.

385,379 Current collector for series electric railways; Sidney H. Short, Denver, Col., assignor, by direct and mesne assignments, to the United States Electric Company, same place.

385,384 Method of joining pipes by electricity. 385,385 Method of electrically welding chains and links. 385,386 Direct electric welding machine; Elihu Thomson, Lynn, assignor to the Thomson Electric Welding Company, Boston, Mass.

385,388 Electric signal transmitter; William C. Thompson, Minneapolis, Minn.

385,390 Secondary or storage electric battery; Sylvanus K. Trippe, Denver, Col., assignor to the Electric Storage Light and Power Company.

385,393 Magnesium lamp; Theodor Weisser, Vohrenbach, near Villingen, Baden, Germany.

385,413 Electric railway, power and lighting appliance; Isaac W. Heysing, Philadelphia, Pa.

385,436 Electric lamp socket; John S. Adams and Albert W. Morrell, Indianapolis, Ind., assignors to the Jenney Electric Company, of Indiana.

385,458 Dynamo electric machine; August Harding, Oakland, Cal.

385,482 Test signal circuit; Charles E. Scribner, Chicago, Ill., assignor to the Western Electric Company, same place.

385,493 Suspension arm for electric lamps; Jas. J. Woods, Brooklyn, N. Y.

385,494 Cut out; Charles D. Wright, Petersburg, Ill.

385,539 Electric switch; Edward F. Bergman, Frankfort, N. Y.

385,558 Secondary battery; Frank King, Fulham, County of Middlesex, England.

385,565 Electro-mechanical typewriter; James F. McLaughlin, Philadelphia, Pa.

385,576 Insulated conductor; Clarence C. Sibley, New York, N. Y., assignor to the Splitdruff Wire Company, same place.

385,647 Electric meter; Elihu Thomson, Lynn, Mass.

385,664 Telephone transmitter; Julius Emmner, Jr., Washington, D. C.

385,672 Electric railway; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Electric Car Company of America, same place.

385,675 Electric motor and dynamo machine; Orazio Lugo, New York, N. Y.

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W. L. MCCULLAGH, AUDITOR.

OFFICE OF THE WESTINGHOUSE ELECTRIC CO.

PITTSBURGH, PA., July 3, 1888.

The Westinghouse Electric Company respectfully calls your attention to the Confidential Circular to the Agents of the Edison Electric Light Company, printed over the signature of E. H. Johnson, President, a reprint of which is given herein; and also to the correspondence which passed between the Officers of the Westinghouse Electric Company and Mr. W. W. Gibbs, Vice President United Gas Improvement Company, of Philadelphia, Mr. Eugene Vanderpoel, President of the Newark Gas Light Company, Newark, N. J., and Chairman of the Executive Committee of the Society of Gas Lighting (for whom a test was made), and Prof. Henry Morton, President of Stevens Institute of Technology, Hoboken, N. J., bearing on the subject matter of the confidential circular of the Edison Company.

We submit this without further comment.

THE WESTINGHOUSE ELECTRIC CO.,
GEO. WESTINGHOUSE, JR., *Pres't.*

[REPRINT.]

CONFIDENTIAL.

To the Agents of the Edison Electric Light Co.:

We are credibly informed that the Westinghouse Company made overtures to the United Gas Improvement Company (of Philadelphia), with a view to have them adopt the Westinghouse system for general introduction throughout the country.

The Westinghouse Company claimed that their system was better than the Edison, and offered to guarantee that the *construction* or *first cost* of a plant would be one-half of that of the Edison, and that the *cost of operation* would be much less.

The United Gas Improvement Company replied that if, instead of the proffered guarantee (upon which they evidently did not place much value), the Westinghouse Company would demonstrate by actual test that their so-called system was *as good as* the Edison, they (the United Gas Improvement Company) would undertake its exploiture and introduction. Competent tests were made of the Westinghouse system at Pittsburgh, Pa., Plainfield, N. J., etc., and of the Edison system in Boston and elswhere. A Westinghouse plant was sent to the Stevens Institute, at Hoboken, N. J., and a thorough test was made by or under the direction of Prof. Morton, assisted by Profs. Denton and Geyer.

The tests were comparative, and made, of course, in the interest and for the information of the United Gas Improvement Company.

An exhaustive report was made, and (as we understand) twenty-four copies printed at a cost of $2,500.

This report has been very effectually suppressed, and in spite of the most strenuous efforts and detective work on the part of some of our friends, we have so far been unable to secure a copy of it. Nevertheless, we have been in communication with several different parties (unknown to one another) who have seen and read the report, and as their statements concerning it completely corroborate each other, we give the conclusions reached by Prof. Morton as they are given to us:

First. Notwithstanding the extravagant claims of cheapness, the construction or first cost of the Westinghouse Alternating or Converting system is practically the same as the Edison.

Second. The Westinghouse Company guarantee twenty lamps per horse-power, and in practice get about six. The Edison Company guarantee twelve lamps per horse-power, and in practice get about fourteen or fifteen. In other words, they cannot come up to the guarantee; we exceed ours.

Third. The *cost of operation* of the Westinghouse system is found by the experts engaged in the test to be very much greater than that of the Edison. This, of course, is the all-important question to the investor.

Fourth. In point of GENERAL EFFICIENCY, RELIABILITY, DISTRIBUTION and REGULATION, the report says that the Edison system is far in advance of the Westinghouse, and that in these essential features the latter is not to be compared with the former.

Although, as before stated, we have not seen this report, nevertheless every one who has seen it gives us the same version of it, and it is known that, as a result of the tests, the United Gas Improvement Company has declined the Westinghouse Company's offer.

We give the information to our agents as it comes to us, in order that they may be aided in their efforts to refute the extravagant and fictitious claims made by the agents of the Westinghouse Company. If the statements made to us are incorrect (which we can hardly believe), our agents might suggest to intending purchasers or investors, that perhaps the Westinghouse Company may be willing to show them the official reports of these tests, on the ground that they will be of greater intrinsic value than the enticing guarantees offered.

The following questions are also pertinent:

1. Why has not the United Gas Improvement Company adopted the Westinghouse system?

2. Why has the report of these tests been so vigorously suppressed?

3. If the Westinghouse Company, as they claim, have a system so superior to and so much cheaper than the Edison, and if, as they pretend, the Edison Company's patents are valueless, why do they desire to bring about a combination with the Edison Company?

The following extract from the New York Sunday "News," of May 27th, is a fair specimen of the reports of this character which are constantly being circulated, and which lack even the faintest suspicion of truth:

BIG CONSOLIDATION OF ELECTRIC COMPANIES.

PITTSBURGH, PA., May 26.—It was current talk in this city to-day, that the Edison Electric Company has offered terms of consolidation with the Westinghouse Electric Company, of Pittsburgh. The terms, it is alleged, are not as yet quite satisfactory to the Westinghouse Company, but that the consolidation of the contending corporations will be speedily effected, is no longer doubted.

Upon investigation we find that this dispatch was received from Pittsburgh by the American Press Association, by whom it was then stereotyped and telegraphed to numerous daily papers all over the country.

4. Why are they constantly importuning Edison experts to come with them, if their own system has reached the state of perfection which they claim for it?

EDISON ELECTRIC LIGHT COMPANY,
BY E. H. JOHNSON, *President.*

[Correspondence between officers of the WESTINGHOUSE ELECTRIC COMPANY and the parties named in Mr. Johnson's Edison Circular.]

PITTSBURGH PA., June 22, 1888.

United Gas Improvement Company, Philadelphia, Pa.:

GENTLEMEN.—We enclose you herewith a type-written copy of a confidential circular issued by the Edison Company to its agents. We shall be glad to hear from you by return mail as to whether, in your opinion, there is any justification for the statements contained in this circular as to your Company having had negotiations of the character referred to.

Yours, very truly, THE WESTINGHOUSE ELECTRIC COMPANY,
GEORGE WESTINGHOUSE, JR., *President.*

UNITED GAS IMPROVEMENT COMPANY.

OFFICE, 333 WALNUT STREET, PHILADELPHIA, June 23, 1888.

George Westinghouse, Jr., Esq., President Westinghouse Electric Co., Pittsburgh, Pa.:

DEAR SIR.—Your favor of 22d inst., which reads as follows, has just come to hand:

> "We enclose you herewith a type-written copy of a confidential circular issued by the Edison Company to its agents. We shall be glad to hear from you by return mail as to whether, in your opinion, there is any justification for the statements contained in this circular as to your Company having had negotiations of the character referred to."

I would reply, in a general way, that so far as the circular makes any reference to the United Gas Improvement Co., which, of course, is the only part of its contents of which I can state of my own knowledge, there is not one particle of foundation for the statements therein contained.

I will answer them specifically:

First. The Westinghouse Company never made overtures to the United Gas Improvement Co., with a view to having them adopt the Westinghouse system for general introduction throughout the country, and therefore of course never made the claims or guarantees set out in the circular.

Second. The United Gas Improvement Co. never having received any such proposition or proffered guarantee could not have made, and did not make, the reply set out in said circular, that "if the Westinghouse Company would demonstrate by actual test that their so-called system was as good as the Edison, that the United Gas Improvement Co. would undertake its exploiture and introduction."

Third. No tests of any kind were made in the interest of or for the information of the United Gas Improvement Co. and no report has ever come to our knowledge of any such tests.

This, I believe, covers the ground fully, and in order to assure myself that none of the other officers or heads of departments of our Company were in possession of any information on the subject of which I was in ignorance, I have submitted your letter and the accompanying copy of circular to a full meeting of our managing committee, which is made up of the heads of all our different departments, and they all unite with me in the above statements. Very truly yours, UNITED GAS IMPROVEMENT CO.

By W. W. GIBBS, *Vice-President.*

PITTSBURGH, PA., June 22, 1888.

Prof. Henry Morton, Stevens Institute, Hoboken, N. J.

DEAR SIR.—We enclose herewith a type-writen copy of a confidential circular issued by the Edison Company to its agents. You will notice that the circular states: "We give the conclusions reached by Prof. Morton, as they are given to us." You can imagine our surprise that the report made by you and your assistants, of which the gentlemen have never supplied us a copy, should be so worded that any one could draw the conclusions that are attributed in this circular. Are the Edison people right in their statement of the case, or have they made a mistake?

Considering the fact that our Company went to a very great expense in the matter of the investigation which was undertaken by you, we feel there is no reason why we should not have been provided with a copy of the reports that were made on our system.

Yours, very truly, THE WESTINGHOUSE ELECTRIC COMPANY,
GEORGE WESTINGHOUSE, JR., *President.*

STEVENS INSTITUTE OF TECHNOLOGY.

HOBOKEN, N. J., June 23, 1888.

George Westinghouse, Jr.:

DEAR SIR.—Yours of the 22d is just received. As regards the action of the Society of Gas Lighting in suppressing my report, I can only say that I had neither voice nor authority in the matter. I only received a copy many months after it was printed, on the condition that I would show it to no one except those engaged in the tests, and no one but Profs. Geyer and Denton has seen it. As to the statement in the Edison circular, I would say as follows: "I never made any tests of any electric lighting system for the United Gas Improvement Co., or made any report on such systems to them." The rest of the statements in the Edison circular are as untrue as their first one, which I contradict as above. I have never said, *in any report to any one*, either exactly or substantially, any of the things attributed to me in said Edison circular. Very truly yours, HENRY MORTON.

Finally Mr. Eugene Vanderpoel, President Newark Gas Light Co., and Chairman of Executive Committee of Society of Gas Lighting, replies as follows:

OFFICE OF NEWARK GAS LIGHT CO.

NEWARK, N. J., June 23, 1888.

George Westinghouse, Jr., Esq.:

DEAR SIR.—Your letter of June 20 has just been received. I have read the confidential letter you enclosed, and find its statements untrue so far as they refer to the report of our committee. The confidential letter states that none of the Edison people have seen the report, and I cannot see that our committee, or the members of the Society of Gas Lighting, who alone have copies of the report, should be held responsible for the imagination of Mr. Johnson.

The United Gas Improvement Company had nothing to do with the report, and have never seen it.

The report was made for and to the Society of Gas Lighting.

The committee, of which I was chairman, several times considered the question of sending you a copy of the report, and all desired to do so, but felt that some of the matter contained in it (although I think you already had the information from other sources) had been obtained confidentially from the Edison people, and we did not think it right to place it in your hands. Neither did we wish that our views, favoring your system so strongly above others, should be used for advertising purposes. We were placed in an awkward position, and thought it would be better to confine the report to the members of the Society. I will at once send your letter to the other members of the committee and get their views, suggesting that, by the removal of the Edison confidential matter, there will be no objection to sending you the report. Yours very truly, EUGENE VANDERPOEL, *President.*

In regard to the rumor reporting consolidation of the Edison and Westinghouse Companies, we would call attention to the following card from the Westinghouse Electric Company, which appeared in the financial column of the *Chronicle Telegraph* of Pistsburgh, May 29th:

A CARD FROM THE WESTINGHOUSE ELECTRIC COMPANY.

To the Financial Editor Chronicle-Telegraph:

Lately there have appeared in your financial columns certain articles and statements relative to the Westinghouse Electric Company which are erroneous and inclined to produce false impressions. You will very greatly oblige the Westinghouse Electric Company by correcting the following more important: The statement with reference to the recent decision against the Edison Company which, as given in your columns, indicates that the Westinghouse Electric Company was the party prominently connected with the suit; whereas, it was a case between the Edison Electric Light Company and the United States Electric Light Company, wherein the pretensions of the Edison Company in reference to a large number of their patents, as set forth in their famous Red Book, were effectually disposed of.

In your last Saturday's issue, also, you headed your financial column "Edison's Greeting to Westinghouse." Nothing has transpired to justify the statements in this article.

Appreciating the position you occupy in financial matters in Pittsburgh, we respectfully call your attention to these facts.

Very truly yours, THE WESTINGHOUSE ELECTRIC CO.

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" " June,	**62,000**	**" " June,**	**270,000**

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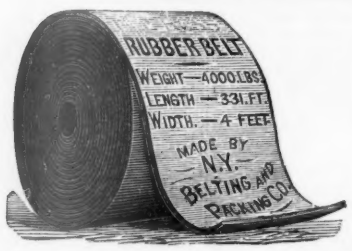

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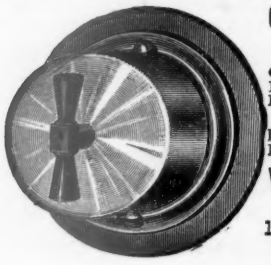

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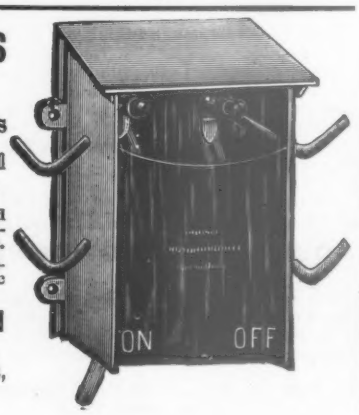

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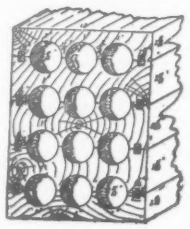

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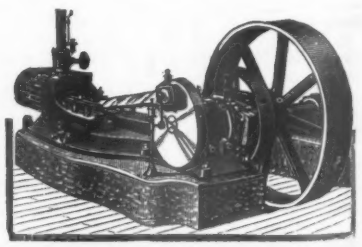

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